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THE HENICOPIDAE OF AMERICA NORTH OF MEXICO.

By Ralph V. Chamberlin.

With Five Plates.

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No. 1.— *The Henicopidae of America north of Mexico.*

By Ralph V. Chamberlin.

The genus Henicops was proposed by Newport in 1844 for two species, *H. maculatus*, from Van Diemen Land, and *H. emarginatus*, from New Zealand. Twenty-four years later Meinert described from Europe a species obviously related to these, placing it under a new genus as *Lamyctes fulvicornis;* but by common consent subsequent workers have, until recently, dropped Lamyctes as a synonym of Henicops. However, in 1901, Pocock restudied Newport's species and pointed out that *maculatus*, which he specified as the type of Henicops, differed from the European species in having the tarsi of the fourteenth and fifteenth pairs of legs, six segmented and those of the anterior pairs trisegmented, the last three pairs of legs in *fulvicornis* having the tarsi only bisegmented and the anterior legs having the tarsi wholly undivided. In accordance with these important differences Pocock again recognized Lamyctes as a distinct genus, at the same time describing two new genera evidently closely allied, Haasiella and Paralamyctes.[1] Other genera having more or less close affinities with Henicops and Lamyctes have also been described by Silvestri [2] and by the present writer. Silvestri and Pocock place these genera, which, it may be noted, occur in the main in the Southern Hemisphere, in a family Henicopidae in contrast particularly with the Lithobiidae, including Lithobius and allies which abound for the most part in the Northern Hemisphere; but Verhoeff in his recent revision of the Lithobiomorpha in Die klassen und ordnungen des thierreichs (1907, **5**, p. 245f), does not recognize the family, denying the sufficiency of the basis for it. Careful study of the genera of the Lithobiomorpha, however, makes it very obvious that these (omitting those of the Cermatobiidae) fall into two compact and clearly separated groups and that, as one of these, the Henicopidae must be given recognition as a distinct and well-defined family.

[1] R. I. Pocock, Some new genera and species of lithobiomorphous chilopods. Ann. mag. nat. hist., 1901, ser. 7, **7**, p. 448–451.

[2] F. Silvestri, Descrizioni di alcuni generi e specie di Henicopidae. Boll. Lab. zool R. scuola sup. agric. Portici, 1910, **4**, p. 38–50.

The following points in which the Lithobiidae differ from the Henicopidae may be mentioned as the most important thus far noted:—

1. The labrum is tridentate instead of unidentate.
2. The inner branch of the first maxillae is armed with ramose or plumose hairs.
3. The outer branch of the first maxillae is only biarticulate.
4. When present, the eyes consist of from several to many ocelli.
5. Sternite of prehensorial segment absent, never constituting a distinct transverse sclerite or collar.
6. On none of the legs is a true tibial process or spur ever present.
7. Articular spines are present on at least part of the legs cephalad of the fourteenth pair.
8. Anal pores never present in adults.
9. Gonopods of male composed of one or, at most, of two articles and never terminating in a pointed process or rudimentary claw.

In regard to point 7 it may be mentioned that in Watobius and allies (subfamily Watobiinae *mihi*), which differ from the typical Lithobiidae in other points also, spines are present only on the tibiae in the place occupied by the tibial spur in the Henicopidae; while in the Henicopidae spines may very rarely occur on trochanter or on trochanter and prefemur of the fourteenth and fifteenth pairs of legs.

The following definition of the Henicopidae is based primarily upon a study of the North American representatives.

HENICOPIDAE (*char. emend.*).

Labrum mesally deeply incised; unidentate; margins of lateral divisions bearing either plumose or else simple or nearly simple hairs.

Inner branch of first maxillae armed with simple hairs exclusively, or in part with hairs simply and shortly laciniate at tips. Outer branch triarticulate; clothed distally with plumose hairs.

Palpus of second maxillae triarticulate; claw four or five partite; distal article bearing on ventral surface toward distal end few to many plumose (ramose) hairs.

Eyes either entirely absent or consisting of a single large ocellus on each side.

Organ of Tömösvary large; situated on ventral border of head, typically caudad of position of ocellus.

Sternite of prehensorial segment well developed, extending trans-

versely as a narrow sclerite or "collar" caudad of the prosternum proper.

Tibia of all legs, or of all excepting the last one to three pairs, bearing at the distal end on the cephalic or cephalodorsal side an acute or spinous tipped process or spur. True articular spines either wholly absent (as in all N. Amer. species) or present only on last two pairs of legs.

Spiracles present on 3rd, 5th, 8th, 10th, 12th, and 14th segments, as in the Lithobiidae, or, in addition also on the 1st; or rarely present only on the 3rd and 10th segments (Catanopsobius).

Coxal pores present on the last two to five pairs of coxae.

Anal pores always present in adults and consisting of a single well-developed pair opening into a common median passage.

Gonopods of female long, triarticulate, and ending in a stout, strongly chitinized claw which is always entire; basal spines, so far as known, 2 + 2 or 2+3. 2nd article glabrous dorsally. Gonopods of male likewise long and triarticulate; ending in a straight, weakly chitinized process usually terminating in a bristle.

Three genera of this family are at present known to occur in America north of Mexico. They may be separated by means of the following key.

aa. A pair of spiracles on the first leg-bearing segment. *Henicopinae* Chamb.
Tarsi of anterior legs undivided. *Lamyctes* Meinert.

aa. No spiracles present on the first leg-bearing segment. *Zygethobiinae* Chamb.

b. Ocelli absent; only the coxae of the last four pairs of legs bearing pores. *Buethobius* Chamberlin.

bb. A pair of large ocelli present; coxae of last five pairs of legs bearing pores. *Zygethobius* Chamberlin.

Lamyctes Meinert.

Naturh. tidsskr., 1868, **5**, p. 266.

Labrum of usual form; lateral pieces not notched each side of median tooth; sides bearing sparse and simple hairs. (Plate **1**, fig. 6).

Inner branch of first maxillae bearing few and entirely simple hairs. Outer branch armed with simple and plumose hairs. (Plate **1**, figs. 3 and 4).

Eyes present, each consisting of a single large ocellus.

Antennae short; articles 24 to 31, but mostly 25 or 28 (in N. Amer. forms); articles beyond the second short, with marked tendency for shortest ones to recur in pairs.

Prosternum conspicuously narrowed cephalad, with anterior margin narrow. Teeth 2+2 or 3+3. (Plate **1**, fig. **7**).

Seven pairs of spiracles present, one pair being present on the first leg-bearing segment.

None of the dorsal plates with posterior angles produced (in N. Amer. species).

First eleven or twelve pairs of legs with tarsi entire, bearing a tibial process (Plate **1**, fig. 12); last three pairs with tarsi biarticulate and tibiae without processes. Coxae of last pair of legs without caudal processes.

Coxal pores present on last four pairs of legs.

TYPE.— *L. fulvicornis* Meinert.

The four species known from the United States are small forms less than 19 mm. long. Males of none of them have been found. The species of this genus are difficult to discriminate.

Key to species.

a. Articles of antennae normally 25; first tarsal joint of anal legs only about four times as long as its greatest width. [1]
L. fulvicornis Meinert.

aa. Articles of antennae 28 (–31); first tarsal joint of anal legs eight times or more as long as its greatest width.

b. Length 5 to 6.5 mm. *L. tivius* Chamberlin.

bb. Length at least 7 mm.

c. Greatest thickness of femur of anal legs 1.5 times the greatest thickness of tibia; antennae 3.7+ times the length of head. *L. pinampus* Chamberlin.

cc. Greatest thickness of femur of anal legs but $1\frac{1}{3}$ times greatest thickness of tibia; antennae 3.2± times the length of head. *L. pius* Chamberlin.

[1] In measuring the joints of the anal legs the method uniformly followed by the author has been to detach one leg and mount it with mesal surface down, measurements being then made by means of an ocular micrometer.

Lamyctes fulvicornis Meinert.

Naturh. Tidsskr., 1868, **5**, p. 266.

Lithobius gracilis Porath, Öfvers. Kongl. vet. akad. forh., 1869, **26**, p. 641.

Lamyctes fulvicornis Stuxberg, Öfvers. Kongl. vet. akad. forh., 1871, **28**, no. 4, p. 504.

Lamyctes fulvicornis Meinert, Nat. tidsskr., 1872, **8**, p. 343.

Lamyctes fulvicornis Stuxberg, Öfvers. Kongl. vet. akad. forh., 1875, **32**, no. 2, p. 72.

Lamyctes fulvicornis Stuxberg, Proc. Cal. acad. sci., 1877, **7**, p. 138.

Henicops fulvicornis Latzel, Die myriop. Oest.-Ung. monarchie, 1880, pt. 1, p. 133, pl. 4, figs. 31–34.

Henicops fulvicornis Haase, Schlesiens chilopoden, 1880, **1**, p. 42.

Henicops fulvicornis Bollman, Entom. Americana, 1888, **4**, p. 6.

Henicops fulvicornis Bollman, Bull. 46, U. S. N. M., 1893, p. 184.

Henicops fulvicornis Chamberlin (in part), Proc. U. S. N. M., 1902, **24**, p. 797.

Lamyctes fulvicornis Chamberlin (ad part. max.), Ann. Ent. soc. America, 1909, **2**, p. 191.

Lamyctes fulvicornis Chamberlin, Pomona college journ. ent., 1910, **2**, p. 368, fig. 132 A.

Lamyctes fulvicornis Chamberlin, Can. entom., 1911, **43**, p. 67, 98.

Diagnosis.— Yellowish brown to chestnut, posterior segments and first one often darker; head mostly brownish red, often blackish along the suture; legs dusky yellow, posterior pairs brownish. Body slender, nearly eight times longer than width of tenth plate, from which the sides are nearly parallel cephalad. Head subcordate, equal in length and breadth or nearly so. Antennae short, the body being about 3.5 times longer; submoniliform; articles 25 (rarely 24 and 28 or 29). Prosternum cir. 1.75 times wider than long; teeth 3+3, the outer on each side smaller. None of dorsal plates with posterior angles produced. Coxal pores circular; usually 2, 3, 3, 3 or occasionally to 2, 4, 4, 4. Anal legs short, the body being cir. 3.5 times longer; tibia between 3 and 3.5 times as long as its thickness dorsoventrally; first tarsal joint 4 times as long as thick dorsoventrally. Gonopods of female with claw long and acute, curved; basal spines 2+2 or, rarely, 2+3, conical, with tips often bent. Length 7–11 mm., but mostly 7–9 mm.

DESCRIPTION.— Dorsum yellowish to chestnut brown, the posterior segments darker as is also frequently the first one. Head, together with the prehensors and prosternum, brownish red; the head frequently darker, blackish, along the frontal suture. Antennae yellowish red with the yellow sometimes dominating; mostly darker proximally than distally. Legs dusky yellow or brownish yellow, sometimes a little reddish distally; posterior pairs darker. Venter dusky brownish yellow with the posterior segments darker, brownish or, in some, of reddish caste.

Slender; but little attenuated cephalad from eighth segment; distinctly attenuated caudad from tenth segment as usual; 8 to 8.5 times longer than width of tenth plate. Body in general sparsely hairy, the hairs being more numerous on the legs; antennae densely clothed, the hairs more numerous distad.

Head subcordate; equal in length and breadth or very nearly so. Rugose; commonly two or three pairs of longitudinal furrows, one pair diverging cephalad with others on caudolateral portion. Punctae rather coarse and scattered.

Prosternum considerably produced cephalad, attaining the mesodistal end of prefemur; anterior edge narrow, at middle narrowly incurved. Teeth 3+3, of which the outer on each side is at the edge of anterior margin, commonly much smaller than others and spinescent (Plate 1, fig. 7). Prosternum not quite 1.75 times wider than its greatest length.

Antennae short, about 2.4 times longer than the head while the body is about 3.5 times their length. (In small specimens often relatively longer, ratio to body length being sometimes as much as 1:2.7). Submoniliform. Nearly always composed of 25 articles, very rarely of 28 or 29, or, in the other direction, of 24. First two articles long, the second being clearly the longer as usual; all others decidedly shorter; the tenth and eleventh articles uniformly shorter than the adjacent ones and in most the third and fourth articles also shortened, though frequently the fourth is shortened without the third as may also be the eleventh without the tenth.

Dorsal plates well arched; in adults mostly with a rather wide longitudinal furrow each side of the middle; the lower lateral and caudal borders set off by sulci paralleling the margins. Sometimes a very shallow median longitudinal furrow may be detected. First, third, fifth, eighth, tenth, twelfth, and fourteenth dorsal plates with caudal corners rounded and with a caudal margin mesally incurved. Seventh plate with caudal margin mesally straight, not at all incurved;

caudal corners rounded. Ninth and eleventh plates with caudal corners obliquely truncate or excised; caudal margin of thirteenth plate straight.

Ventral plates rugose and uneven; on most a deeper furrow parallel with and not far from the anterior margin and a similar one toward caudal margin, the two on anterior plates often united at ends by longitudinal furrows and thus forming a large rectangular impression.

Twelfth to fifteenth pairs of legs without tibial process. Tarsi of last three pairs of legs distinctly biarticulate; those of the immediately preceding legs often showing a suture faintly developed. All others with tarsi strictly undivided.

Anal legs short, about equalling the antennae, the body being thus near 3.5 times longer. Tibia mostly between 3 and 3.5 times as long as thickness dorsoventrally; first tarsal joint four times as long as dorsoventral thickness; the second tarsal joint 4.6 times longer than thick. Length of anal legs to that of the penult about as 4:3.

Coxal pores small, circular; mostly 2, 3, 3, 3, occasionally 2, 4, 4, 4. Each pore bearing coxa commonly with a longer bristle at distal ventral edge.

Gonopods of female sparsely pilose; claw long, acute, and entire, moderately bent and with concave side excavated; basal spines 2+2 (with rarely an extra one on one side), conical with one or both of each pair often bent ectad at tip.

Length 7–11 mm., but mostly 7–9 mm.

Agenitalis.— Very pale yellowish brown, with a violet tint showing through from the tissues beneath chitin; head yellowish with the region of eyes and apex of head darkened.

Ocellus very distinct.

Antennae composed of 21 to 23 articles.

Prosternal teeth 3+3, the outer one on each side minute.

Coxal pores 1, 1, 1, 1.

Gonopods extended but showing no trace either of claws or of basal spines.

Length 4.5–5 mm.; greatest width .6–.7 mm. (Latzel).

Type Locality.— Europe.

North American Localities.— Maine (Orono!); Massachusetts (Cambridge!); New York (New York City at Mt. Lebanon); Pennsylvania!; Wisconsin (Haugen! Eau Claire! Ashland! Beloit! Menominee!); Michigan (Powers! Watersmeet! Marinette!); Illinois (Peoria!); Minnesota (Winona); Nebraska (Omaha!); Colorado (Colorado Springs!); Utah (Lake Point! Salt Lake City! East Mill

Creek! Provo!); Idaho (Pocatello!); Oregon (Portland!); Arkansas (Little Rock, see Bollman, but possibly not the real *fulvicornis*).

Also distributed throughout Europe.

No male of this species has ever been recognized. The author has examined more than a hundred individuals without detecting a male and has sectioned a considerable number of females without finding spermatozoa in the genital ducts although these are to be found readily enough in female Lithobii. The present evidence lends probability to the view that this species, as likely also its relatives in North America, is parthenogenetic in its usual reproduction.

This species prefers the immediate vicinity of water although the author has found it well removed from streams at times. In Wisconsin it is very common among stones and sticks at edges of streams and it was found in similar localities at Peoria, Illinois. At times it may be seen to go beneath the water if the rock upon which it is running is partly submerged.

Lamyctes tivius Chamberlin.

Ann. Ent. soc. America, 1911, **4**, p. 33.

Diagnosis.— Yellowish brown to dark brown, the last segments and the first one mostly darker. Head dusky or blackish about eyes and along suture with frontal region commonly paler. Legs yellow to brown. Body slender; between eight and nine times longer than the width of tenth plate; narrowed gradually from eighth plate cephalad. Body nearly glabrous, the hairs being short and very sparse. Head subcordate, slightly longer than wide. Antennae short; submoniliform; articles 28, varying occasionally to 31. Prosternum cir. 1.68 times wider than long; teeth 3+3, the outer one each side small and spiniform. None of dorsal plates with caudal angles produced. Coxal pores small; 2, 3, 3, 3. Anal legs short; tibia 4.5 to 5.5 times longer than thick; first tarsal joint cir. 8 times (rarely to only 7 times) longer than thick. Length 5–6.5 mm.

Description.— Dorsum yellowish brown to very dark brown, with the anterior and posterior segments darker as usual, dusky in the darker individuals. Often a more or less irregular dusky median band showing especially on the more anterior and more posterior segments, the borders of which are also sometimes darker. Head blackish about eyes and along suture, with the frontal region often distinctly paler.

Prosternum and prehensorial feet also of about same shade as head. Legs and antennae yellow or, in darker individuals (see var. a *infra*), the latter brownish with distal end paler and the anal legs dusky. Venter greyish to yellowish brown, the posterior segments darker as usual.

Slender; the body attenuate gradually and but little from the eighth segment cephalad and more abruptly narrowed from the tenth segment caudad; from eight to nine times longer than width of tenth plate. Nearly glabrous, being provided very sparsely with very short hairs which are more numerous on the legs. Antennae densely clothed as usual.

Head subcordate; nearly equal in length and breadth being but slightly longer (ratio 35: 33 or less). Marked with two diverging sulci on posterior portion and with a number of shorter and more indistinct ones more lateral much as in *fulvicornis*. A weak furrow extending from anterior edge between antennae caudad to suture and more indistinctly to caudal margin.

Prosternum relatively a little narrower than in *fulvicornis*, being usually but about 1.68 times wider than greatest length. Extending forward to same point, or nearly so, as in *fulvicornis*. Prosternal teeth, small; 3+3, the outermost on each side much the smallest, minute or rarely obsolete or absent.

Antennae short; cir. 3.2+ times longer than the head, while the body is nearly 2.8 times longer than them. Antennae distad of the large second article submoniliform, and the articles all short. Articles from 28, the most usual number, to 31; the third and fourth, seventh and eighth, and tenth and eleventh are nearly always conspicuously shorter than the adjacent articles, while in some individuals the thirteenth and fourteenth may also show reduction. (See Plate 2, fig. 10).

Dorsal plates with the median region strongly arched and the borders low with the edges somewhat uplifted as in *fulvicornis*, presenting a longitudinal sulcus parallel to lateral margin at inner edge of depressed border with a transverse sulcus parallel to caudal border and connecting the two lateral sulci, this transverse sulcus, especially on the more anterior major scuta sharply impressed and conspicuous. Convex portion of plate in front of the transverse suture with a weaker and finer longitudinal median sulcus and one or two pairs laterad of this. The transverse sulcus, especially on the anterior segments, seems to be much more distinct than in *fulvicornis* and also relatively farther from the caudal margin. Caudal margins of minor plates

straight, or that of ninth a little bent forwards at ends but the corners of none obliquely truncate.

Ventral plates commonly roughened by transverse furrows of which one toward the anterior edge and one toward the caudal are most distinct and of these two the caudal one commonly more deeply impressed.

Tibial processes and segmentation of tarsi as in *fulvicornis*.

Anal legs short; longer than antennae in ratio 12:11, longer than penult legs in ratio 3:2; body about 2.6 times longer. Tibia 4.5–5.5 times longer than thick; first tarsal joint 7–8 times longer than thick, mostly 8 times longer; second tarsal joint 7.5 times longer than thick. (See Plate 2, fig. 9).

Coxal pores small, circular, nearly always 2, 3, 3, 3.

Claw of female gonopods long, pointed, a little curved and concave mesally as usual. Basal spines 2+2, rather stout, conical, somewhat flattened distad and often bent ectad toward tips.

Length 5–6.5 mm.

Agenitalis — Stage I.— Body and head light brown, the latter dusky or blackish at sides. Antennae and legs very light, brownish white.

Ocellus distinct but pale.

Antennae composed of 24 articles; distad of second article strictly moniliform.

Prosternal teeth small and pale; 3+3, the outer one minute, the relations being the same as in the adult.

Dorsal plates showing the transverse furrow very distinctly, the lateral ones also being evident; the median elevated portion of plate with a median and, on each side of it, another distinct longitudinal sulcus.

Coxal pores 1, 1, 1, 1.

Anal glands very distinct.

Gonopods appearing as short conical buds, already three jointed, but with no trace of claw or basal spines and entirely lacking hairs.

Length 3.4 mm.

New Orleans, var. a.

Pullus — Stage IV.— Coloration nearly as in the *immaturus* but a little paler.

Ocellus pale.

Antennae in one specimen composed of 19 articles of which the eleventh, twelfth, thirteenth, and sixteenth show signs of subdivision. In a second specimen apparently slightly less advanced than the preceding, 15 articles are present in the right antenna, which seems to be regenerating after a loss, and 20 on the left. Beyond second article strictly moniliform.

Three last pairs of legs appearing as long, closely appressed buds, of which the first, in one specimen, is very faintly segmented distad of the coxa, the others more indistinctly so; pale; without trace of hairs excepting one long ventral bristle on the relatively large coxa of each leg.

A single coxal pore present on each coxa of twelfth legs, this a little pigmented.

Anal glands showing very distinctly.

Anal segment with a pair of short bristles immediately beneath glands and two pairs of very long setae caudad of the glands, the two bristles of each pair being near the median line and crossing each other obliquely.

Length cir. 3 mm.

New Orleans, var. a.

LOCALITIES.— Mississippi (Byram! Holly Springs!); Louisiana (New Orleans! var. a); Alabama (Jackson!).

Variety a.— The specimens from New Orleans are uniformly darker than those from Mississippi and Alabama, appearing to be a little more strongly chitinized, the darker extremes of coloration noted in the description of the adults above being met with in these individuals. The tarsal and tibial joints of posterior legs are on the average also relatively more slender than in the others. Otherwise no differences could be detected, however, and complete intergradation is likely to be found.

NOTE.— The record of this species from Hot Springs, North Carolina, given in connection with the original description was an error, all specimens studied from that locality belonging to the next species. The measurement of 7.5 mm. given as the maximum length in the description mentioned pertained to a small specimen of the latter species, *L. pius*.

LAMYCTES PIUS Chamberlin.

Lamyctes tivius pius Chamberlin, Ann. ent. soc. America, 1911, 4, p. 33.

DIAGNOSIS.— Dorsum brown, the posterior segments darker and distinctly reddish. Head brownish red or chestnut, darkest back of suture. Legs yellowish, the more caudal ones darker and tinged with red. Body slender; cir. 8.8 times longer than width of tenth plate; less strongly narrowed cephalad than *tivius*. Head subcordate, slightly longer than wide. Antennae very short, being but one third

the length of the body; articles 28 (rarely 29). Prosternal teeth 3+3, the outer one reduced as usual. None of dorsal plates with posterior angles produced (for form see Plate 2, fig. 7). Coxal pores, 2, 3, 3, 3. Anal legs short, but longer than antennae, the body 2.6 times longer; tibia 5.7 or 5.8 times longer than thick dorsoventrally; first tarsal joint 8 to 9 times as long as thick; second tarsal joint 8 times longer than thick. Claw of female gonopods long, slender, and curved; spines rather stout, conical and distally flattened. Length 7.5–9.5 mm.

Description.— Dorsum brown, with the posterior segments darker and distinctly reddish. Head brownish red or chestnut, darker caudad of the frontal suture. Antennae light reddish brown, pale distad. Legs yellowish, the more caudal ones becoming brown and tinged, especially the proximal joints, with red. Venter brown, with the first and last segments darker; the prosternum and prehensors similar but tinged with reddish.

Slender, cir. 8.8 times longer than width of tenth plate; eighth and tenth plates of same width; body narrowed cephalad from eighth plate but little less than in *tivius*. Body sparsely clothed with short hairs which are as usual more abundant on legs; hairs of body rather more numerous than in related species, particularly than in *tivius*.

Head subcordate; very slightly longer than wide; roughened by a number of shallow longitudinal furrows.

Prosternum of nearly same form as in *fulvicornis*. Teeth 3+3, the outermost reduced as usual.

Antennae short; 3.2 times longer than head; one third the length of body; composed of 28 or rarely of 29 articles, of which those distad of the long second one are short and moniliform as in the other species; the third and fourth (or sometimes the fourth alone), seventh and eighth, tenth and eleventh, and thirteenth and fourteenth are reduced as in *tivius*.

Dorsal acute mostly with a pair of longitudinal furrows each side of middle which often rises ridge-like between them; in addition other smaller and more shallow, irregular furrows or sulci may be detected; furrows limiting the lateral and caudal depressed borders as in related species. Caudal margin of ninth and eleventh plates bowed forwards at ends, the corners of these plates in some appearing obliquely truncate but the line of truncation making but a slight angle with mesal portion of margin; caudal margin of thirteenth plate straight all the way across.

Ventral plates rugose; a deeper transverse furrow toward caudal

margin and one or two weaker ones parallel with this on anterior portion; a number of longitudinal impressed lines near sides.

Tarsi of last three pairs of legs biarticulate in the usual way, those of more anterior pairs undivided. Tibial process well developed on the first eleven pairs of legs and also weakly developed on the twelfth.

Anal legs longer than antennae in about ratio 15:13; longer than penult legs in ratio 5:3; tibia 5.7–5.8 times longer than its greatest, dorsoventral, thickness; first tarsal joint 8 to 9 times as long as thickness; second tarsal joint also about 8 times longer than thickness.

Coxal pores small and circular as in the other species; 2, 3, 3, 3.

Gonopods of the female with the claw long and rather slender; curved and excavated on mesal side; basal spines 2+2, rather stout, conical and somewhat flattened distad, the inner smaller than the outer.

Length 7.5–9.5. mm.

LOCALITIES.— North Carolina (Hot Springs! Asheville!); Georgia (Atlanta!); New Jersey (Westfield! Haddonfield!); Pennsylvania (Philadelphia!).

This species, it may be seen, in general structure and relative proportions parallels the preceding species, *L. tivius*, in a very close and interesting way; but it is at once to be distinguished by its conspicuously and constantly larger size and by its more reddish color. It also is less strongly narrowed cephalad, has some dorsal plates of somewhat different shape as above indicated, is more hairy and especially seems always to have the tibial and tarsal joints of the anal legs more slender. It seems also to occupy a distinct area, the center of which is probably the higher section of North Carolina and the adjacent parts of neighboring states; while *L. tivius* apparently occurs only in the lower and coastal region of the southeastern States.

LAMYCTES PINAMPUS Chamberlin.

Pomona college journ. ent., 1910, p. 2, 368, fig. 132 B.

Lamyctes fulvicornis Chamberlin (in part), Ann. Ent. soc. America, 1909, 2, p. 191.

Lamyctes pinampus Chamberlin, Ann. Ent. soc. America, 1911, 4, pl. 3, fig. 3.

DIAGNOSIS.— Dorsum dark brown, the caudal segments and often the first one darker; head brown to reddish brown, darker on sides about and in front of ocelli; legs dusky yellow to brown. Head sub-

cordate; slightly longer than wide. Body slender; near 8.25 times longer than width of tenth plate; sides but slightly converging cephalad. Antennae short; the body 2.5 times longer; articles 28, with third and fourth, seventh and eighth, tenth and eleventh, thirteenth and fourteenth, and sixteenth and seventeenth reduced. Prosternal teeth 3+3, of usual relative size and form. None of dorsal plates with posterior angles produced (for precise form see Plate 2, fig. 4). Coxal pores 2, 2, 2, 2 to 3, 3, 3, 3. Anal legs longer than in related species and much more so than in *fulvicornis;* body but about 2.35 times longer; tibia about 5.3 times longer than thick; first tarsal joint 8 times as long as thick. Claw of female gonopods nearly straight in adults, less curved than in the other species; outer spine robust, with the inner considerably smaller. Length 7–9 mm.

Description. — Dorsum dark brown, with the caudal plates and sometimes the first one darker; plates often darkened along middle and edges. Head darker, brown to reddish brown; darker on sides about and in front of ocelli. Antennae reddish yellow to yellowish red, the first two to four articles often distinctly less red than the others. Ventral plates dusky yellowish brown to brownish yellow, the caudal ones of reddish tinge. Legs similar in color to venter, uniform.

Slender; only very slightly narrowed cephalad from eighth plate; body nearly 8.25 or 8.3 times longer than width of eight and tenth plates, which are of same width.

Head subcordate; very slightly longer than wide. A shallow longitudinal furrow extending caudad between antennae; on posterior portion of plate two longitudinal sulci diverging cephalad and on each side of these chiefly two others which are shorter and extend mesocephalad; two weak transverse sulci a little in front of caudal margin; lateral borders often set off by weak, fine furrows parallel with margins.

Prosternum and prosternal teeth as in the preceding species or very nearly so; that is, both scarcely differing from that of the type species, *L. fulvicornis,* which see.

Antennae short; about 3.8 times longer than head; body about 2.5 times longer than antennae. Articles nearly always 28; of these the third and fourth (or fourth alone), seventh and eighth, tenth and eleventh, thirteenth and fourteenth, and sixteenth and seventeenth are typically more shortened than the others, though in a minor number the two latter are not different in length from the adjacent ones.

Dorsal plates with caudal and lateral furrows setting off a wide low border as in the other species. Elevated median portion with a

longitudinal median sulcus and, on each side of this, two or three sulci a little diverging cephalad. Form of ninth and eleventh plates varying with age and stage of chitinization; in larger, fully chitinized individuals the caudal margin is straight with the corners not excised, or occasionally shortly so on one side; in small individuals, on the contrary, the corners are usually more obliquely and more clearly excised, much as in *fulvicornis;* while intermediate specimens have the eleventh straight like the thirteenth, the ninth still retaining the obliquely truncate or excised corners. (Plate 2, fig. 4).

Ventral plates roughened with rather fine transverse furrows or sulci of which one or two toward the caudal margin are deeper. On most plates a fine longitudinal furrow parallel with each lateral margin. Usually last three or four plates marked on each side with several distinct furrows running obliquely from the edge mesocephalad; last segment finely roughened but lacking the transverse sulci except commonly the deeper caudal one.

Anal legs longer than in the other species, the length of body being only about 2.35 times greater; longer than penult legs in ratio 53:33, or about 1.6 times longer. Tibia 5.3 times as long as thick; first tarsal joint eight times as long as thick; and the second tarsal joint $8\frac{1}{3}$ times longer than thick. Greatest thickness of femur to greatest thickness of tibia as 1.5:1. Thickness of tibia to that of first tarsal as 1.74:1. Lengths of third, fourth, fifth, sixth, and seventh articles to each other as 37:40:46:40:30.

Coxal pores small and circular; 2, 2, 2, 2 to 3, 3, 3, 3, but most often 2, 3, 3, 2,

Claw of gonopods in fully grown females nearly straight, less curved than in the other species; flattened or excavated on mesal side; more curved in younger specimens. Basal spines 2+2; conical; the outer on each side robust, the inner being relatively smaller than in the other species and usually more acute than the outer.

Length 7–9 mm. in types; will probably be found to range considerably above this.

Praematurus.— Living specimens secured at Las Vegas, Nev., were light brown with a marked violet tinge, the latter fading in alcohol. Head a little darker and weakly reddish. Antennae (alcoholic specimens) yellowish brown; more greyish, less pigmented, proximally. Legs pale. A specimen from Claremont, Cal., has dorsum light brown, with the first and last plates darker, especially along the caudal borders; head dark caudad of frontal suture and blackish on sides about ocelli which have a decidedly bluish cast, and the frontal region orange

and contrasting sharply with the remaining portion; antennae orange-brown, paler proximally and on distal article; venter dusky yellowish brown, the caudal segments tending to reddish.

Head of same form as in adult.

Dorsal plates as in small adults or nearly so; the ninth and eleventh plates obliquely excised much as in the adult *fulvicornis*, but the oblique line relatively shorter.

Prosternal teeth 3+3, small, pale, with the outer on each side minute; proportions of prosternum as in the adult.

Antennae composed of 26 to 28, but mostly of 27, articles; in a minor number of specimens subdivision of one or of two of these articles is weakly indicated.

Coxal pores 2, 2, 2, 2.

Gonopods nearly as in adult; claw a little more curved; basal spines stout, conical, the outer proportionately wider at base than in adult, the inner relatively more slender than in adult but not so much shorter as usual in this stage in Lithobii. Bristles nearly fully developed.

Length 6–6.5 mm.

Localities:— Nevada (Las Vegas!); California (Claremont!).

Buethobius Chamberlin.

Ann. Ent. soc. America, 1911, **4**, p. 34.

Labrum deeply incised as usual at middle; tooth conical and strongly chitinized; lateral divisions with border each side of the incision bent abruptly dorsad, strongly chitinized, and weakly notched at mesocaudal angle in such a way as to leave there a small and at times nearly obscure blunt tooth-like process apparently homologous with the lateral tooth in Lithobius, etc.; edge of lateral divisions bearing long plumose hairs of which those at the mesal end of the series are distally laciniate and are longest and also bearing simple hairs in an area each side of the mesal incision. (Plate **3**, fig. 6).

Mandibles bearing four dentate divisions of plate of which the one at end opposite the aciculi is simple and conical the other three being set obliquely and each tridentate with the middle tooth longest and the one toward convex surface smallest (see Plate **3**, fig. 3); bearing at caudal corner of distal end a row of ten to twelve large, flattened, acute aciculi which are bipectinate over the distal portion and also ectad of these and the teeth a series of finer plumose bristles.

Outer branch of first maxillae rather indistinctly triarticulate; its ultimate article clothed on mesal surface with plumose bristles and bearing at anterior end a much larger laciniate bristle (see Plate **3**, figs. 2 and 4). Inner branch small, discrete from coxa, clothed with simple bristles of which one at apex is upon a much broader base and is stouter than the others (see fig. 2).

Eyes absent.

Antennae of medium length or long. First two articles long, the immediately succeeding ten or eleven greatly shortened, with those more distad longer. Articles so far as known, 36 to 45.

Prosternum with the anterior margin wide, not narrowly produced as in Lamyctes; teeth small, mostly 3+3.

Six pairs of spiracles present, none occurring on the first leg-bearing segment.

None of dorsal plates, so far as known, with posterior angles produced.

First twelve or thirteen pairs of legs with an acutely pointed tibial process or spur; the tarsi of these legs only indistinctly or not at all divided, the suture not affecting the dorsal side of article, but in part detectable on ventral side. (Plate **3**, fig. 9).

Coxal pores present on last four pairs of legs; pores few, uniseriate and small.

Both males and females occurring commonly under the same conditions.

Type.— *B. oabitus* Chamberlin.

In the known species the body is more slender than in Lamyctes and the legs are relatively longer. The coloration is light throughout, yellow and pale orange with no darker pigment occurring.

In addition to the type species one other is at present known. The two species may be discriminated as follows:—

Key to species.

a. Antennae composed of 36 articles; more than half as long as the body. *B. oabitus* Chamberlin.

aa. Antennae composed of 43–45 articles; nearly always clearly less than half as long as the body. *B. coniugans* Chamberlin.

Buethobius oabitus Chamberlin.

Ann. Ent. soc. America, 1911, **4**, p. 34.

Diagnosis.— Dorsum, with antennae and legs, yellow; head and posterior plates of dorsum orange. Slender, being $8\frac{3}{4}$ or more times as long as width of tenth plate; sides nearly parallel cephalad of tenth plate. Head broadly subcordate; wider than long. Antennae long, being more than half the length of the body; articles 36. Prosternum a little less than twice as wide as long; teeth small and pale, 3+3. Posterior angles of none of the dorsal plates produced. Legs long, the ultimate pair especially so, slender and without special lobes in the male; claw of anal and of penult legs single. Coxal pores small, circular. Claw of female gonopods long and slender; strongly curved; basal spines acutely conical, with the slender distal portion black. Gonopods of male long, attenuated distad; distal article bearing an acutely pointed spine. Length 10–12 mm.

Description.— Color in general yellow or light yellowish brown. The head, prosternum, and prehensorial feet, and, usually the more caudal segments both above and beneath, clear orange. Antennae and legs clear yellow.

Slender, the length being $8\frac{3}{4}$ or more times as great as the width of the tenth dorsal plate. Nearly parallel sided for most of the length, being but little narrowed cephalad of the tenth plate, but more decidedly caudad as usual. Body in general sparsely hirsute; the dorsal plates with stouter bristles along the lateral margins and the minor ones with a transverse series near caudal margin; legs more densely clothed with finer hairs among coarser spinescent bristles which are few on tarsi, where they occur chiefly at the indicated juncture of first and second joints but more numerous on tibia and more proximal joints.

Head broadly subcordate; wider than long in about ratio 11:10; conspicuously narrowed in front of middle, caudad of which the sides but slightly converge; the caudolateral corners well rounded. (Plate **3**, fig. 7).

Prosternum not much less than twice as wide as greatest length (32:17); not much produced cephalad, the anterior margin being very wide, widely angularly and but shallowly incised at middle. Teeth small, pale, 3+3, subequal; the innermost on each side well removed from the middle line; the middle tooth on each side farther from the outermost than from the innermost. (Plate **3**, fig. 1).

Antennae long; clearly more than half the length of the body, ordinarily reaching the ninth segment. Articles 36; of which the first two are longest and the third shortest, the others increasing gradually from the third distad and commonly showing a tendency for single longer articles to alternate with pairs of somewhat shorter ones. Subdensely clothed with long bristles.

Organ of Tömösvary rather large, circular; on ventral border of head immediately in front of level of greatest width. (Plate **4**, fig. 1).

Major dorsal scuta, excepting the sixth, with the caudal margin convexly rounding at corners and mesally weakly incurved; caudal margin of sixth plate slightly convex a little bent cephalad toward ends. Minor scuta have the caudal margin straight; the caudal corners of the second, fourth and sixth very shortly obliquely excised, at least on one side; the caudal margin of the ninth and eleventh, especially of the former, bent forwards at ends nearly always more strongly on one side than on the other, or else on one side only; caudal margin of thirteenth a little incurved mesally. Tergites well arched; marked with several pairs of somewhat irregular longitudinal sulci of which one a little each side of middle and mostly curving ectad at its middle and one or two each side farther toward the lateral margin are most constant and most sharply impressed; shorter impressions elsewhere largely breaking the surface into short and irregular fine rugae.

Most ventral plates with a distinct and rather wide transverse depression or furrow at level of legs, this furrow on some anterior segments replaced by two which are often considerably separated; usually several other transverse furrows or sulci which are more distinct on caudal portion of plate.

Legs all long, the ultimate pair being especially long and slender; anal and penult legs ending in a single claw or the accessory of the latter obsolete, all other legs terminating in three claws. (Plate **3**, figs. 8 and 9).

Coxal pores small and circular; 3, 3, 3, 3–4, 4, 4, 4.

Gonopods of the female with the claw long, slender, and acute; strongly bent. Basal spines 2+2, acutely conical; the slender distal portion usually blackish. (Plate **3**, fig. 10).

Gonopods of the male long; attenuated from base distad. Distal article ending in an acutely pointed spine. Genital duct opening through a distinctly protruding, broadly rounded process.

Length 10–12 mm. Width of tenth plate 1.3–1.4 mm.

Localities.— Mississippi (Byram! Canton!).

Buethobius coniugans Chamberlin.

Can. entom., 1911, **43**, p. 383.

Diagnosis.— Light orange, with head and caudal segments darker; antennae and legs yellow, except anal pair of latter which are orange. Slender; $8\frac{3}{4}$ times longer than width of tenth plate; only slightly narrowed cephalad. Antennae normally less than half the length of the body; articles 43–45; hairs shorter than in *oabitus*. Prosternum twice as wide as long; teeth 3+3, small. Legs all long and slender. Anal legs slender and about half the length of body. First thirteen pairs of legs with tibial process. Coxal pores 2, 2, 3, 2–3, 3, 3, 3. Gonopods of male well clothed with long bristles; ultimate article terminating in a straight spine which may be a little bent at end. Gonopods of female with claw long and acutely pointed and strongly curved; spines conical, flattened distad. Length 8–10 mm.

Description.— Light orange with caudal segments darker. Head also darker but with the frontal region pale. Antennae and legs yellow, darker proximally; caudal pairs of legs darker, orange, especially proximally.

Body slender, being about $8\frac{3}{4}$ times longer than width of tenth plate; only little narrowed cephalad. Entire body sparsely clothed with short among longer coarser hairs; more densely clothed as usual on legs where the longer coarse bristles are more abundant on ventral surface of tibia and proximal joints than on the dorsal surface; hairs on tarsi shorter, a pair of coarse ones on ventral surface marking the junction of the two more or less consolidated articles with often a pair distad of this. (See Plate 4, fig. 3).

Head subcordate; widest near middle, caudad of where the sides are nearly straight and a little converging, while cephalad the head is strongly narrowed; caudal margin a little excurved. Wider than long in about ratio 40:39.

Prosternum twice as wide as long. Anterior margin wide, not much extended cephalad; angularly incised at middle. Teeth 3+3, small, subequal, the outer farther from the middle one than the latter from the most mesal.

Organ of Tömösvary large, circular, and colorless; on ventral border of head at level of greatest width.

Antennae nearly always considerably less than half the length of the body, the average ratio of length of body to that of antennae being near 2.45:1, the limits observed being 2 and 3 respectively to 1, the

greater length being the rarer. Subdensely clothed with hairs that are shorter than those of *oabitus*. Articles 43–45 of which the first two are largest, a succeeding series of about ten typically greatly shortened, those at the ends of the series being shortest, while the articles distad of this series become clearly longer.

Major dorsal plates, excepting the sixth, with the caudal margin a little convex and rounded at ends and mesally incurved; the sixth with corners obliquely excised with the intervening caudal margin straight or slightly excurved. Caudal margin of minor tergites straight, the corners of ninth and eleventh in most obliquely excised though in some distinctly excised on one side only while in others the ends of the caudal margin are merely more or less evenly curved forwards. Dorsal plates with mostly four distinct longitudinal sulci, one a little removed from each lateral margin and one a little each side of the median line, shorter broken impressed lines wrinkling the surface between them; a weaker transverse impression in front of caudal margin.

Ventral plates finely wrinkled transversely, mostly so on the caudal half to two thirds of length, and a longitudinal furrow or impression a little mesad from each lateral margin. Last two or three sternites smoother; often with fine impressed lines running from caudolateral edge cephalomesad but these short and not affecting the middle portion of plate.

Legs all long. First twelve pairs with tarsi undivided but with the tegument between the two parts not strongly chitinized and thus more or less flexible, there being, however, no true joints. Tarsi of last three pairs of legs truly biarticulate. First thirteen pairs of legs with spinous tipped process or spur. First thirteen pairs of legs with three well-developed claws; the fourteenth pair also with accessory claws but these reduced.

Anal legs long and slender and otherwise alike in both sexes; nearly half as long as body (7:15); longer than penult in about ratio 14:11.

Coxal pores circular and rather small; 2, 2, 3, 2–3, 3, 3, 3; the more proximal in each series smaller than the more distal.

Caudal process of 15th coxae long, acute, and spinous tipped.

Gonopods of male with the three articles all well clothed with long bristles. Terminal spine often a little bent at apex. Penial process cylindrical or more or less narrowed or constricted proximally. (Plate 4, fig. 3).

Gonopods of female with articles bearing long bristles ventrally, but glabrous on dorsal surface. Claw long and acutely pointed and

strongly curved. Spines 2+2, conical, flattened distad, the outer one on each side a little stouter.

Length of male 9–10 mm. Length of female 8–9 mm., the average size being less than that of male.

Pseudomaturus.— Body brownish yellow, with the head and caudal segments light orange; antennae and legs yellow.

Proportions in general nearly as in adult; but in specimen measured head a little longer than wide (47:46).

Antennae of about same proportionate length as in adults; composed of 39 articles in which the series of ten shortened articles following the second is already present.

Prosternal teeth 3+3 with relations as in *maturus*.

The long bristles of dorsum arranged chiefly along lateral edges and in a transverse row across caudal portion of each minor tergite and of sixth with a few in a transverse row across anterior portion; on ventral plates chiefly confined to a transverse row across anterior border; the hairs elsewhere short.

Coxal pores 2, 3, 3, 3; pigmented.

Tibial process of first thirteen pairs of legs distinct; no indication of subdivision in tarsi of first twelve pairs; claws as in *maturus*.

Anal glands strongly developed.

Sternite of genital segment with 8–10 bristles on each side. First and second joints of female gonopods each with about four, the third with 2–3 bristles. Claw of gonopods shorter and paler than in adults and more obtuse, well excavated on mesal side. Basal spines smaller than in adult but nearly similarly related, but the inner ones relatively a little smaller.

Length 7.5 mm.

Praematurus.— Coloration nearly as given for *pseudomaturus*.

Head a little longer than wide.

Dorsum with relatively very long setae along the lateral margins of plates, the one at each posterior corner directed caudad. Each minor tergite with the usual transverse row of bristles along caudal border. Fewer long bristles in a transverse row across anterior border of each ventral plate.

Antennae relatively shorter than in adult and *pseudomaturus*. Articles 31 with the series of more shortened ones succeeding the second consisting of but 5, each of which probably would normally divided give to the series the adult number.

Prosternal teeth 3+3; small and pale; related as in *maturus*.

Coxal pores 1, 2, 2, 2.

Anal glands well developed.

Sternite of genital segment bearing on each side three bristles. First article of female gonopods with three bristles, second with two or three and the ultimate with two of which one is long and one short. Claw pale and thin, weak. Basal spines all present, but short and pale with the inner one of each pair more slender and much shorter than the outer, extending scarcely distad of the middle of the latter.

Length 6.75 mm.

LOCALITIES:— California (Berkeley! Mill Valley!).

ZYGETHOBIUS Chamberlin.

Ent. news, 1903, **14**, p. 335.

Labrum mesally deeply incised and unidentate as in other genera of the family; tooth acutely conical and strongly chitinized; lateral divisions not at all notched at median excavation. Lateral portions with a fringe of plumose hairs along margin much as in Buethobius, some of which also occur on caudal portion of dorsal surface which also bears more cephalad an area of simple hairs (see Plate **5**, fig. 2).

In the mandibles at distal end and beginning at cephaloventral end of dentate plate are, first, three pairs of stout, obliquely placed teeth followed next to caudal angle by a fourth pair consisting of one large tooth and a much smaller one. Pectinate aciculi and plumose hairs nearly as in Buethobius but the aciculi fewer, being mostly about 6 in number (see Plate **5**, fig. 5).

Both branches of the first maxillae separated from the coxae. Inner branch armed with simple hairs and hairs that are laciniate at distal end, the latter showing two, three, and more branches, but no truly ramose or plumose hairs are present. Outer branch clearly triarticulate; the ultimate article bearing plumose hairs on mesal surface; no branched aciculi at anterior end. (Plate **5**, figs. 3 and 4).

Eyes present, each consisting of a single large ocellus which is larger than that in Lamyctes and is situated farther forward.

Antennae long; in known species consisting of from 38 to 43 articles.

Prosternum with anterior margin wide and not much extended forward; teeth 3+3. (Plate **4**, fig. 6).

Only six pairs of spiracles present, none being found on first leg-bearing segment.

Posterior angles of ninth, eleventh, and thirteenth, or of these with seventh, or of these with both sixth and seventh, strongly produced.

First fourteen pairs of legs or else all fifteen pairs with acute tibial process. (Plate 4, fig. 8). Prefemur of legs with small pointed process at distal end on dorsal side. Tarsi of all legs biarticulate. The first tarsal joint increasing in size from first to last pairs of legs, in the caudal pairs being very long and slender. All legs ending in three claws.

Coxal pores present on the last five pairs of legs.

Both males and females occurring commonly under the same conditions.

Gonopods of female of type usual in family, the claw being large and entire and serrate along dorsal edge (see Plate 4, fig. 4).

Gonopods of male with ultimate article ending in a large, straight, weakly chitinized process or claw the edges of which are finely serrate (see Plate 5, fig. 8).

TYPE.— *Z. dolichopus* Chamberlin.

The members of this genus are of medium size. The body in all is conspicuously narrowed cephalad from the eighth segment and the legs are relatively long, particularly the posterior pairs. Of the four species at present known, three occur in the mountains of the western part of the continent, the fourth occurring in the mountains of Virginia and Tennessee.

Key to subgenera and species.

a. First fourteen pairs of legs with tibial spurs, none being present on the anal pair; posterior angles of ninth, eleventh, and thirteenth or of these and the seventh as well, produced. *Zygethobius* Chamb.

b. Body prevailingly brown, reddish pigment being absent or nearly so; more loosely joined and relatively longer articles of antennae beginning with the fifteenth.

c. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced; articles of antennae 39 or 40; body eight times longer than width of tenth dorsal plate. *Z. dolichopus* Chamberlin.

cc. Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced; articles of antennae 41; body but about seven times as long as width of tenth plate. *Z. columbiensis*, sp. nov.

bb. Body brown to chestnut, reddish pigment commonly promi-

nent; more loosely joined and relatively longer articles of antennae beginning with the seventeenth.
Body eight times as long as width of tenth plate.
Z. sokarienus Chamberlin.

aa. All legs with well-developed tibial processes; posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced. *Zantethobius* Chamb.
Articles of antennae 43; body seven times longer than width of tenth dorsal plate. *Z. pontis* Chamberlin.

Zygethobius dolichopus Chamberlin.

Henicops dolichopus Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 797.
Henicops fulvicornis Chamberlin, (in part), Proc. U. S. N M., 1901, **24**, p. 25.
Zygethobius dolichopus Chamberlin, Ent. news, 1903, 14, p. 335.
Zygethobius dolichopus Chamberlin, Pomona college journ. ent., 1910, **2**, p. 368.

Diagnosis.— Dorsum yellowish brown to dark brown, with first and last plates commonly darker and more reddish; head darker, often chestnut to nearly black with median and posterior portions paler; legs yellow to brown, more reddish distad, the posterior pairs darkest; the whole often suffused with violaceous. Head subrotund, longer than wide. Body strongly narrowed cephalad from tenth dorsal plate and more abruptly caudad; eight times longer than width of tenth plate. Antennae long; articles 39 or 40; articles distad of the fourteenth more loosely joined and showing an alternation of shorter ones in pairs with single longer ones, but the last six all long. Prosternal teeth, 3+3, small, the two innermost on each side closer together. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. Coxal pores 3, 3, 3, 3–3, 4, 5, 5, 4, circular. Legs all long, especially the caudal pairs; tibial process present on legs of first fourteen pairs. Claw of female gonopods large, not strongly curved; basal spines 2+2 or 2+3; conical in outline, dorsally excised distad, with plane of inner nearly at right angles to outer. Length 11.4–12.6.

Description.— Color of dorsum yellowish brown to dark brown, first and last plates darker, sometimes reddish brown. Head frequently very dark, its anterior and lateral portions reddish, at times verging to black with the middle and posterior portions paler. Antennae yellow to brown, reddish brown or chestnut at base. Ventral plates smoky yellow. Legs mostly yellow, brown or somewhat red-

dish brown toward extremities; posterior pairs darkest. The color of all parts as above given subject to modification by a more or less strong violet tint from the deeper tissues, this being particularly strong in the head and in the anterior and posterior dorsal plates and particularly in younger or recently moulted individuals.

Body moderate; about eight times longer than width of tenth dorsal plate; strongly narrowed cephalad from tenth dorsal plate and abruptly narrowed caudad of this plate as usual. The cephalic plate sparsely hirsute with long and short bristles, the first dorsal plates being clothed subsimilarly to cephalic plate, the last few plates more sparsely clothed, the median portion of the most posterior being subglabrous; legs clothed more abundantly with shorter, finer hairs among longer and stouter, spinescent bristles which are more abundant on the ventral and lateral surfaces of joints proximad of tarsus; antennae densely subpilose.

Head mostly longer than wide, typically in about ratio 12:11; subrotund, widest near middle of length. Lateral margins strongly convexly rounded at middle, caudad of which they are nearly straight or weakly incurved and converge to the truncate caudal margin with the corners well rounded; conspicuously narrowed in front of middle; anterior margin between antennae from nearly straight to a little incurved. Strongly convexly elevated. A distinctly marked furrow extending from ocellus to ocellus and curving caudad from its ends to middle; on caudal portion of plate two broad and distinct furrows which diverge cephalad to the transverse furrow; a broad shallow median longitudinal impression in front of the suture. Lateral and anterior borders of head commonly depressed.

Ocellus very large; strongly convex; bluish; margin not sharply defined.

Antennae long; attenuated from base, becoming much more slender distad. Articles 39 or 40, when 40 the ultimate articles commonly proportionately shorter; second article much longest as usual; usually the four succeeding the second subsimilar to each other, of moderate size, while the next eight are shorter and likewise similar to each other; articles succeeding the fourteenth longer and more slender and more loosely articulated, with among them in most specimens a regular alternation of two shorter articles with one clearly longer one excepting that the last six are all long.

Prosternum twice as wide as long; the anterior margin arching forward in a semicircle, angularly incised at middle as usual. Prosternal teeth 3+3, small and pale; on each side the two innermost

proximate and often elevated together, the outermost being separated by a wider and deeper interval and the prosternal margin beneath it less produced.

The posterior angles of the ninth, eleventh, and thirteenth dorsal plates strongly produced. Dorsal plates strongly arched; each of the major scuta with five more or less evident longitudinal sulci, two lateral parallel with each side, one median and two intermediate diverging caudad; the two lateral sulci continuous with a transverse depression or furrow (sometimes double) running parallel with and a little cephalad of the posterior margin, corresponding lines often being traceable on the head.

Ventral plates with a number of transverse impressed lines on caudal half, one at middle and one between this and caudal margin ordinarily deeper than the others.

Legs all long, the more caudal ones being conspicuously so and ordinarily elevating the caudal portion of body considerably. Tarsi relatively long, the first joint being much longer than the second. Tibial process present on each leg of the first fourteen pairs.

Anal legs very long and slender, not at all crassate or otherwise specially modified in either male or female.

Last five pairs of coxae deeply furrowed or fluted along caudoventral surface, the furrow being limited by well-chitinized ridges or plates. In these furrows occur the uniseriate, circular pores which in number and arrangement vary from 3, 3, 3, 3, 3 to 3, 4, 5, 5, 4.

Claw of female gonopods large, acute, and weakly incurved. Basal spines 2+2 or 2+3; the flattened, broader surface, conical in outline with the inner one set nearly at right angles to the outer and in ventral view therefore appearing much thinner; both spines usually bent ectad at distal end.

Anal glands conspicuous; the common median passage relatively large.

Length 11.4–12.6 mm.; width 1.5–1.7 mm.; length of antennae 5.6–6 mm.; of anal legs 6–6.5 mm.

Praematurus.— Ground color light brown to yellow, but in life this color mostly masked by the violet from beneath. Head appearing purple, often very dark. Antennae light brown or yellow. Ventral plates in life appearing mainly violaceous or lavender.

Antennae composed of from 31 to 36 articles.

Prosternal teeth 3+3 as in the adult.

Coxal pores moderately large; groove shallow; 2, 2, 2, 2, 2–3, 3, 3, 3, 3,

Gonopods short. Claw short and pale; basal spines 2+2 but small, the inner one commonly a short point.

Length of body 8–8.4 mm.; width 1.2 mm.; length of antennae 4.6 mm.; of anal legs 4–4.3 mm.

Agenitalis — Stage I.— Color yellowish brown, head darker. Legs and antennae smoky white.

In the one specimen of this stage obtained the forty articles of the antennae are already present, the individual doubtless being exceptional in this regard.

Prosternal teeth minute or obscure.

Ocelli distinct; considerably larger than in the following stage.

Gonopods appearing merely as incipient buds.

Coxal pores 2, 2, 2, 2, 2.

Length of body 5.5 mm.; width .65 mm.; length of antennae 2.5 mm.

Pullus — Stage IV.— Last three pairs of legs appearing as pale appressed buds.

General color yellowish. Antennae and legs white.

Ocelli small; colorless.

Coxal pores 1, 1; very small.

Length of body 3–4.6 mm.; length of antennae 2.1–2.5 mm.

Localities.— Utah (in the Wahsatch Mts., chiefly at elevations from 6,000 up to 10,000 feet above sea-level. Farmington Canyon! City Creek Canyon! Mill Creek Canyon! Neffs Canyon! Little Cottonwood Canyon! Big Cottonwood Canyon! American Fork Canyon! Spanish Fork Canyon! Also in Uintah Mts.!); California (Truckee! in the Sierra Nevada).

In the Wahsatch Mts. the species is found at the upper elevations under wood and stones along streams, about springs, and near melting snow, and is not uncommon under the fallen logs of coniferous and quaking aspen woods away from running water. It prefers especially cool and humid situations.

Zygethobius sokarienus Chamberlin.

Can. entom., 1911, **43**, p. 382.

Diagnosis.— Dorsum reddish brown to chestnut, with head and ultimate segments darker; head uniform in color; legs brown, paler distally, the posterior pairs darker. Head subrotund, longer than wide; widest in front of middle; sides but moderately convexly bulging. Body about eight times as long as width of tenth plate; strongly

narrowed cephalad. Antennae long; articles 38 or 39; articles distad of the sixteenth relatively more slender and more loosely articulated, with shorter ones in pairs alternating with longer single ones but last six all of longer type. Prosternum with anterior margin widely rounding as usual; teeth 3+3. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. Coxal pores 2, 3, 3, 3, 3–3, 4, 4, 4, 4; circular and small. Legs long; tibial spur occurring on each leg of the first fourteen pairs. Claw of female gonopods long and acute, moderately curved; basal spines 2+2, distally thin, conical in broader outline, with the inner set at an angle with the outer. Gonopods of male long; ending in an acutely pointed and bristle-tipped process or claw of which the ventral edge is serrate. Length 11–13 mm.

DESCRIPTION.— Dorsum reddish brown or chestnut, with the ultimate segments darker. Head darker than dorsum, uniform. Antennae dark reddish brown proximally, becoming pale distad. Venter from light to dark brown, often of reddish tinge, the posterior segments usually darker. Prosternum usually of same color as venter but sometimes darker, in which case the prehensors are paler, especially distally. Legs usually brown, sometimes dark excepting proximally and distally; the posterior pairs, as usual, commonly darker than the others.

Body moderate; about eight times longer than width of tenth plate; conspicuously narrowed from tenth plate cephalad and abruptly caudad. Sparsely clothed with shorter, finer hairs and with longer coarse spinescent bristles, the latter being more especially arranged in series at lateral and caudal edges of dorsal plates and also across anterior portion of major ones. The bristles more abundant on legs. Antennae densely clothed with straight hairs of which there are short and moderately long ones, the latter becoming reduced from proximal to distal articles.

Head normally longer than wide (12:11, nearly); subrotund, but sides not so strongly convexly bulging as in *dolichopus;* widest in front of middle, from where the sides caudad are substraight or a little incurved to the rounded caudal corners; caudal margin straight; head narrowed cephalad as in *dolichopus.* Head convexly elevated. Conspicuously constricted or furrowed in a semicircle curving caudad from the ocelli; two furrows on caudal portion of plate diverging forward from a common point and on each side of these are several subparallel sulci; a shallow median longitudinal furrow extending caudad between antennae to the transverse furrow. (Plate **4**, fig. 5).

Ocelli very large; bluish.

Antennae long, being one half or nearly one half as long as the body. Articles 38 or 39, of which the second is much longer; the fourteen articles succeeding the second are short and closely telescoped, the first four in this series being commonly somewhat larger than the others; articles distad of the sixteenth clearly longer and more freely joined, with shorter ones in pairs normally alternating with single longer ones in the usual way, excepting the six ultimate which are all of the longer type.

Dorsal scuta well arched, with lateral and caudal borders depressed and the lateral margins bent somewhat dorsad; each with a distinct median longitudinal furrow extending entirely across plate; on each side several shorter sulci of which the two most mesal converge together caudad, forming thus a v-shaped mark. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. Caudal margins of plates apparently less incurved than in *dolichopus*.

Caudal margin of more anterior sternites truncate, but in the posterior ones more or less convexly rounded. Plates marked with fine transverse furrows of which one caudad of and one cephalad of the middle are usually distinctly deeper.

Prosternum twice as wide as long. Anterior margin semicircular. Teeth 3+3; subequal; the interval between these teeth in some about equal but in others the outer one on each side is more widely removed from the median than the latter is from the innermost. (Plate **4**, fig. 6).

Legs of usual type, all being long and having tarsi markedly slender with the first joint especially long. The small, pointed process at distal end on dorsal side of the prefemora better developed and more spine-like on the more caudal pairs of legs. Tibial process present in first fourteen pairs of legs only. (Plate **4**, fig. 8).

Anal legs in both sexes long and slender and without special modifications. The lengths of third, fourth, fifth, sixth, and seventh articles are to each other about as 38:41:50:61:28 and their widths as 13:11.5:8:4:3. In the penult legs the lengths of these joints are related as 31:35:41:45:16.

Porigerous surface of last five pairs of coxae but moderately depressed and the furrow typically not extending entirely to distal end of the joint, the lateral walls or chitinous ridges uniting distad of it to form a median keel. Pores circular, decreasing in size proximad; 2, 3, 3, 3, 3–3, 4, 4, 4, 4.

Claw of female gonopods long and acute, but moderately curved,

the ventral edge finely serrate. Basal spines 2+2, flattened distad; conical in broader outline; the inner on each side set more or less at an angle to the outer and its outline in ventral view, presenting its lesser thickness, as a consequence appearing much more slender than the outer. (Plate **4**, fig. 4, and Plate **5**, fig. 6).

Gonopods of the male long and with same divisions as in the female; ending in a long, straight and acutely pointed process or claw which is bristle tipped and has its ventral edge serrate, this claw but weakly chitinized. Articles densely clothed with long bristles. Penial process subcylindric, running to a point at apex on dorsal side. (Plate **5**, fig. 8).

Length 11–13 mm. Males and females apparently not differing in size.

Locality.— California (Mill Valley!).

Of the ten type specimens, four are males.

Zygethobius columbiensis, sp. nov.

Diagnosis.— Dorsum brown; head dusky; antennae and legs flavid. Head suborbicular; of nearly equal length and width. Body robust, being only about seven times as long as the width of the eighth dorsal plate; strongly narrowed cephalad as in related species. Antennae long; articles 41, the more loosely joined ones beginning with the fifteenth, among them being the usual alternation of shorter and longer ones and the last six all being of longer type. Prosternal teeth very small, 3+3. Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced. Legs long and slender; tibial spurs present as usual. Claw of female gonopods long and moderately strongly curved; basal spines very acutely pointed, of moderate width at base. Length 14.5 mm.

Description.— Original color difficult to determine from type specimen. At present the specimen is brown, paler along the median dorsal line. Head dusky. Antennae and legs flavid.

Body robust, being about seven times longer than the width of the eighth dorsal plate, the tenth plate being nearly of same width as the eighth; strongly narrowed cephalad from eighth plate to the first which is slightly narrower than the head; third plate manifestly wider than the first. Widths of head and first, third, eighth, tenth, and twelfth dorsal plates to each other about as 40:39:45:56:55:52. First plate 1.85 times wider than long; widest a little cephalad of its

middle, the sides being moderately convex and rounding in well mesad at anterior ends.

Head about equal in length and breadth; suborbicular with the sides strongly convexly bulging caudad of the ocelli. A rather deep transverse sulcus a little in front of caudal edge and two pairs of longitudinal sulci diverging cephalad from this transverse furrow.

Ocelli large; bluish.

Antennae long; extending to or beyond the middle of the body; strongly attenuated distad. Articles 41; of these the first fourteen are relatively more compact as in *dolichopus*, etc., but the transition to the relatively slender and more loosely joined articles more gradual than usual; beyond the fourteenth article shorter articles recur in pairs in the ordinary way, the last six, however, all being of the longer type.

Prosternum twice as wide as long. Teeth very small or almost obscure; 3+3. Margin on each side meeting its mate at very obtuse angle, a mesal incision being scarcely developed.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced; angles of the last three long and acute, while those of seventh have caudal side long and convex, the mesal portion of the plate being deeply incurved. Dorsal scuta strongly arched, with the caudal and lateral borders depressed as usual; each plate with a pair of distinct longitudinal sulci with outside of each one of these a second shorter and more or less divergent sulcus.

Anterior ventral plates broadly depressed from edges to middle. Most plates with indications of three longitudinal sulci of which one toward each side is more distinct than the median. A transverse furrow a little in front of caudal margin especially distinct; one or two more anterior ones present which are less so.

Legs all long with their tarsi conspicuously slender as usual, considerably more so than the tibia which, in turn, is abruptly more slender than the femur. Prefemoral and tibial processes as usual.

Porigerous area of coxa deeply depressed, with the edges well chitinized. Pores circular; about 3, 3, 4, 4, 4, to 4, 4, 4, 4, 4 in number and arrangement.

Claw of female gonopods entire, long and strongly curved, acutely pointed. Spines as usual, acutely attenuated from base distad; of but moderate stoutness.

Length 14.5 mm.; antennae 8 mm. long; width of eighth dorsal plate 2.1 mm.

Locality.— British Columbia (Powder Creek, Kaslo!).

The single type is a female.

ZYGETHOBIUS PONTIS Chamberlin.

Ann. Ent. soc. America, 1911, **4**, p. 34.

DIAGNOSIS.— Dorsum chestnut with a narrow longitudinal stripe blackish; first segment darker; head deep or blackish brown; legs brown, paler proximally, excepting last pairs which are darker, being blackish proximally and pale distad. Head subrotund, widest caudad of middle. Body robust; but seven times longer than width of tenth plate; strongly narrowed cephalad and more abruptly caudad as usual. Antennae very long; articles 43; those articles distad of the fourteenth more loosely joined with the usual occurrence of shorter articles in pairs excepting among the last four which are all long. Teeth of prosternum 3+3. Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced, those of the seventh least so. Coxal pores circular, small; 3, 3, 4, 4, 4. Legs long and especially slender distad; tibial process present and well developed on all fifteen pairs of legs.

DESCRIPTION.— Dorsum chestnut in color with a narrow longitudinal median stripe blackish; first segment darker than the others. Head deep or often blackish brown. Prehensors, prosternum, and antennae reddish, the last mentioned becoming pale, yellowish distad. Venter yellowish to light brown, with the more caudal plates reddish. Legs brown, paler proximally than distally; last pairs of legs darker, blackish proximally, pale distad.

Robust, being but seven times longer than the width of the tenth dorsal plate. Strongly narrowed cephalad and caudad of the tenth dorsal plate, the first segment being conspicuously narrow. Clothed sparsely with coarse longer hairs and shorter finer ones, the longer ones occurring chiefly along edges of dorsal plates and on the head as spinescent bristles conspicuous among the shorter ones; antennae subdensely clothed with straight hairs and finer shorter ones that are bent or curled at their tips; legs as usual more densely clothed than body.

Head subrotund; widest a little caudad of the middle, the sides caudad of this being nearly straight and converging to the rounded caudad corners; the longer anterior portion of head conspicuously narrowed; anterior margin between antennae straight or mesally a little indented. Head elevated; marked with a transverse furrow or constriction along or a little caudad of the suture, each end of the furrow being in front of the corresponding ocellus; a v-shaped impression consisting of two furrows diverging from a common point cephalad

on posterior portion of head with on each side of this two short sulci parallel to the corresponding arm of the v and on each side parallel with the margin a long furrow extending from a little in front of the caudal margin forward and dorsad of upper edge of ocellus where it joins the transverse furrow or constriction.

Ocelli large but smaller than in *sokarienus*, etc.

Antennae very long, being more than half the length of the body. Articles 43, of which the second is as usual relatively very long, the next twelve being short and compactly telescoped, those distad of these being more slender and more loosely joined; the first ten articles immediately distad of these precede a much longer one which in turn is succeeded by shorter ones than which the four preceding the ultimate are much longer; ultimate article very long. (Plate **5**, fig. 9).

Prosternum twice as wide as greatest length or nearly so. Anterior margin semicircularly curved forwards. Teeth 3+3, of which the outermost on each side is more removed than the innermost from the median one.

Dorsal plates with median portion well elevated; a deep wide furrow immediately mesad of each lateral and somewhat upturned margin, a second narrower sulcus occurring a little mesad of this while between this and the median longitudinal furrow are several shorter sulci. Posterior angles of the sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced, the corners of the seventh being least extended of these.

Ventral plates transversely wrinkled, two to four — but mostly two — of the sulci being conspicuously deeper than the others.

Legs proportioned as in the previously described species, the tarsi being conspicuously slender with the first joint very long. Tibial process present on all fifteen pairs of legs. (Anal leg shown in Plate **4**, fig. 9).

Coxal pores small and circular; 3, 3, 4, 4, 4. Ridges limiting the depressed porigerous area of moderate height, the two edges converging to a median keel on distal portion of coxa.

Gonopods of female with claw long, well curved, rather slender and acutely pointed. Basal spines as usual, the inner ones of each pair in ventral view presenting its edge and thus a much more slender outline than the outer one.

Length 10.5–11 mm.

Localities.— Virginia (Natural Bridge!); Tennessee (Johnson City!).

PLATE 1.

PLATE 1.

LAMYCTES FULVICORNIS Meinert.

Fig. 1. Mandible.
Fig. 2. Bipectinate hair or aciculus of same more highly magnified.
Fig. 3. Ramose or plumose hair from outer branch of first maxilla.
Fig. 4. First and second maxillae.
Fig. 5. Tip of palpus of second maxilla.
Fig. 6. Labrum.
Fig. 7. Prosternum and prehensors.
Fig. 8. Ventral view of caudal end of body (female), showing ultimate coxae with their pores, sternite of genital segment and gonopods, and the anal glands.
Fig. 9. Cross-section through anal glands.
Fig. 10. Head, dorsal view.
Fig. 11. Anal leg.
Fig. 12. Leg of fifth pair, cephalic aspect.

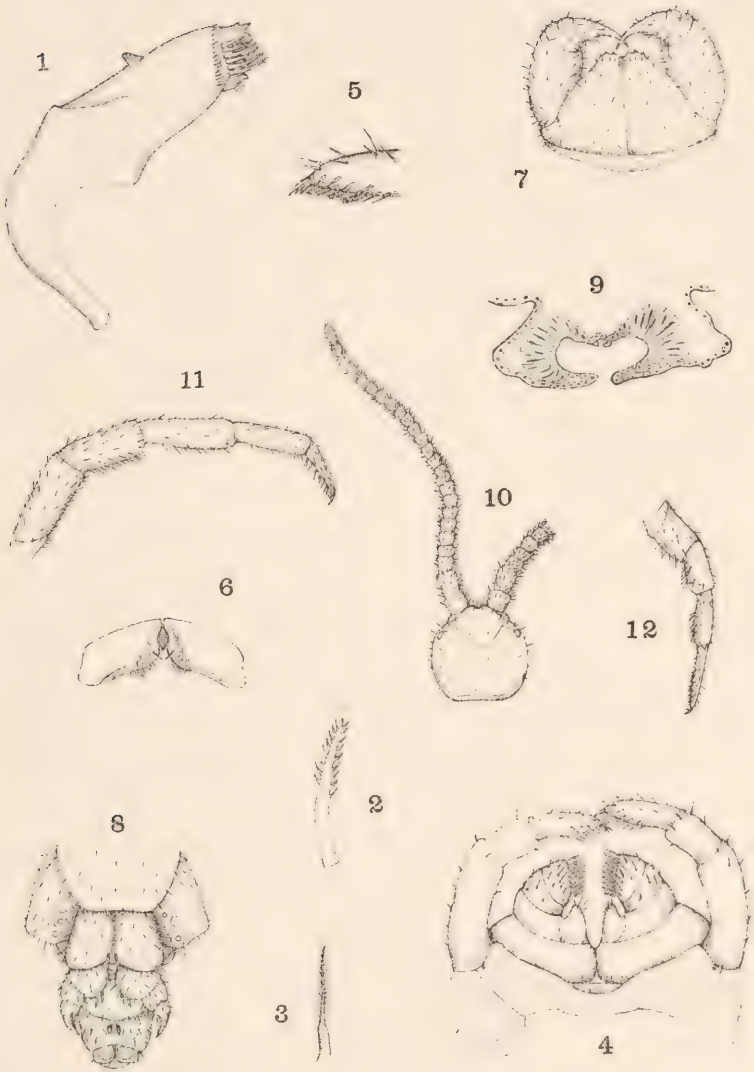
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PLATE 2.

PLATE 2.

LAMYCTES FULVICORNIS Meinert.

Fig. 1. Dorsal plates, excepting most anterior.
Fig. 2. Antenna.
Fig. 3. Anal leg (from specimen 10 mm. long).

LAMYCTES PINAMPUS Chamberlin.

Fig. 4. Dorsal plates.
Fig. 5. Antenna.
Fig. 6. Anal leg (from specimen 8.6 mm. long; same magnification as for fig. 3).

LAMYCTES PIUS Chamberlin.

Fig. 7. Dorsal plates.
Fig. 8. Anal leg (from specimen 8.5 mm. long; same magnification as for figs. 3 and 6).

LAMYCTES TIVIUS Chamberlin.

Fig. 9. Anal leg (from specimen 6 mm. long; same magnification as for preceding fig.).
Fig. 10. Antenna.

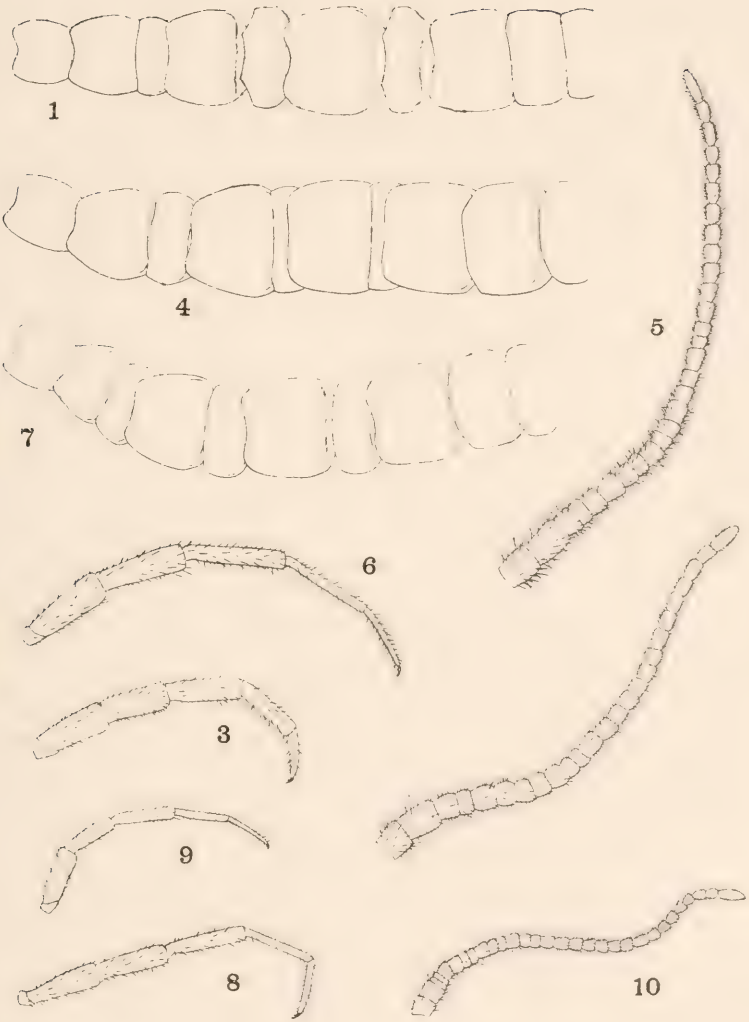
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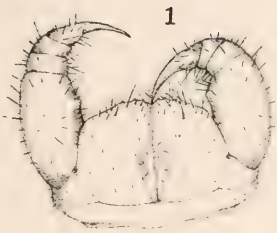
PLATE 3.

PLATE 3.

BUETHOBIUS OABITUS Chamberlin.

Fig. 1. Prosternum and prehensors.
Fig. 2. First maxillae.
Fig. 3. Mandible.
Fig. 4. Branched aciculus from tip of outer branch of first maxilla.
Fig. 5. Ramose or plumose hair from outer branch of first maxilla.
Fig. 6. Labrum.
Fig. 7. Head, dorsal aspect.
Fig. 8. Anal leg.
Fig. 9. Fifth leg, cephalic aspect.
Fig. 10. Sternite of genital segment and gonopods of female.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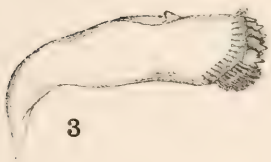
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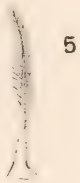
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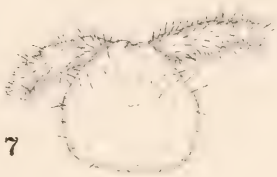
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PLATE 4.

PLATE 4.

BUETHOBIUS OABITUS Chamberlin.

Fig. 1. Head, ventral aspect, showing organ of Tömösvary.
Fig. 2. Distal joints of palpus of second maxilla.

BUETHOBIUS CONIUGANS Chamberlin.

Fig. 3. Ventral view of posterior region of body of male, showing gonopods, etc.

ZYGETHOBIUS SOKARIENUS Chamberlin.

Fig. 4. Claw of female gonopods, dorsal aspect.
Fig. 5. Head, dorsal aspect.
Fig. 6. Prosternum and prehensors.
Fig. 7. Anal leg.
Fig. 8. Leg of fifth pair, cephalic aspect.

ZYGETHOBIUS PONTIS Chamberlin.

Fig. 9. Anal leg.

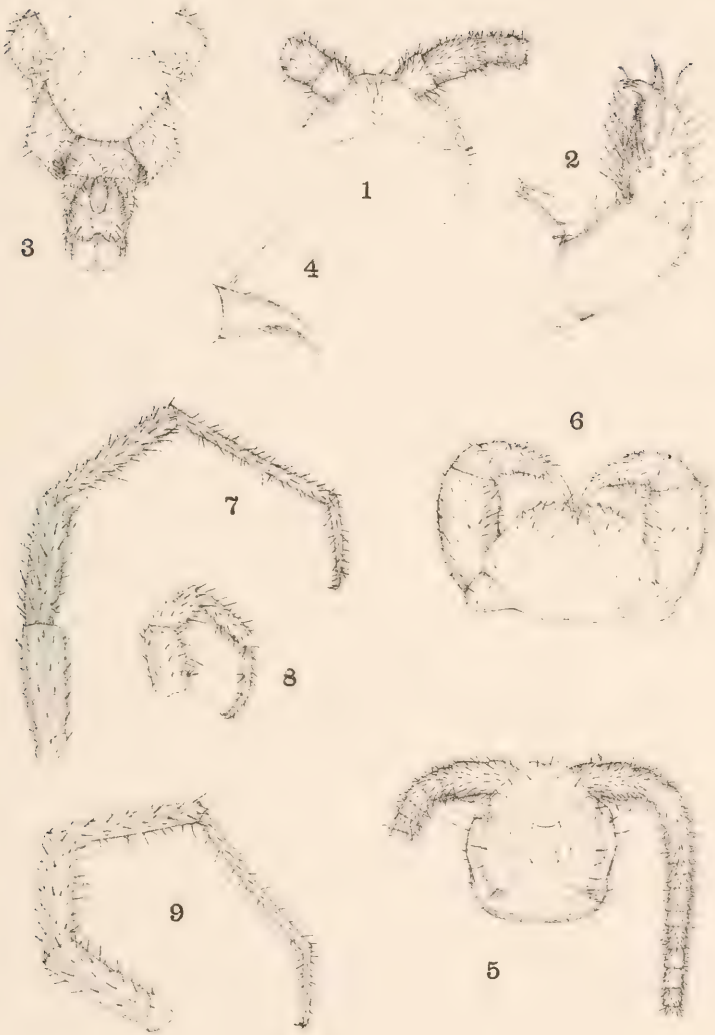
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PLATE 5.

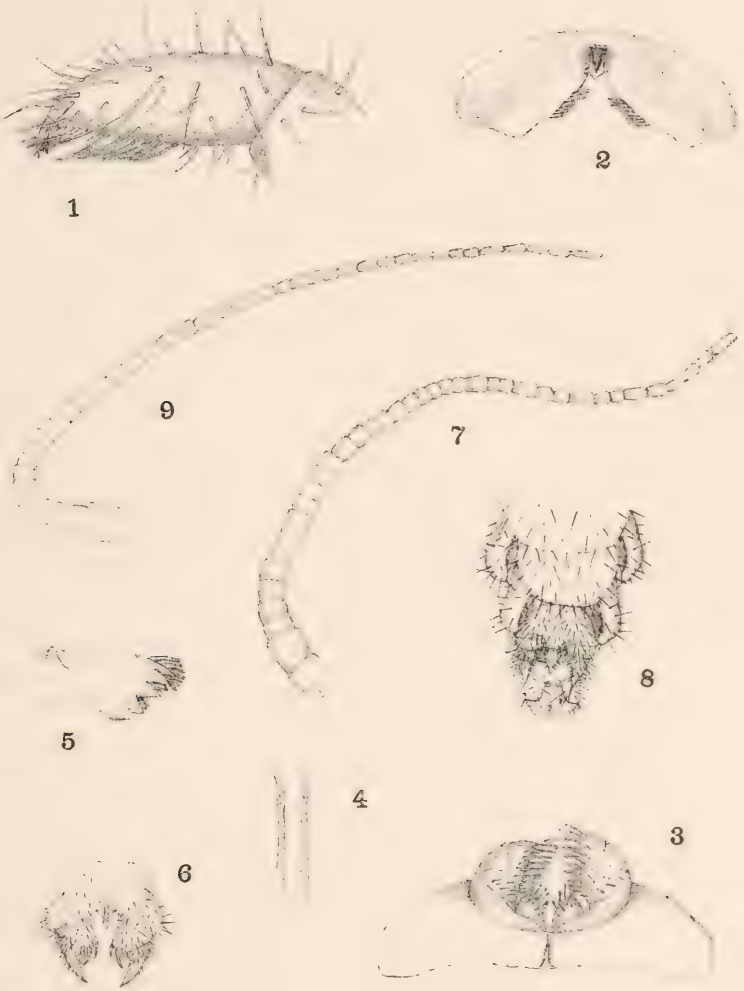
PLATE 5.

Zygethobius sokarienus Chamberlin.

Fig. 1. Distal article of palpus of second maxilla.
Fig. 2. Labrum.
Fig. 3. First maxilla.
Fig. 4. Laciniate bristles from inner branch of first maxilla more highly magnified.
Fig. 5. Mandible.
Fig. 6. Sternite of genital segment and gonopods of female.
Fig. 7. Antenna.
Fig. 8. Ventral view of caudal region of body of male showing gonopods, etc.

Zygethobius pontis Chamberlin.

Fig. 9. Antenna.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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
VOL. LVII. No. 2.

THE LITHOBIID GENERA NAMPABIUS, GARIBIUS, TIDABIUS, AND SIGIBIUS.

BY RALPH V. CHAMBERLIN.

WITH FIVE PLATES.

CAMBRIDGE, MASS., U. S. A.,
PRINTED FOR THE MUSEUM.
NOVEMBER, 1913.

No. 2.— *The Lithobiid Genera Nampabius, Garibius, Tidabius, and Sigibius.*

By Ralph V. Chamberlin.

The four new genera dealt with in the present paper include the smallest of the known North American species of Lithobiidae. None of them exceeds ten mm. in length, most of them averaging materially less than this. They occur principally among the layers of damp fallen leaves, under the bark of logs, and in the looser loam of open woods. All seem to have the death-feigning instinct more or less pronounced, when suddenly jarred or otherwise frightened often flexing the body laterally into a circle and lying rigid for some time, when they may be handled with forceps or otherwise without their relaxing. Because of their small size and the effectiveness with which they conceal themselves, specimens of these species are not often secured by the general collector; but one looking for them especially and understanding their habits may nearly always secure one or more species in appropriate habitats throughout the United States excepting the Southwest where they are replaced by *Oabius* (*pylorus* Chamb., *tiganus* Chamb., etc.), *Hesperobius* (*medius* Chamb., *obesus* Stuxb., and allies), and related genera to be considered in a succeeding Bulletin. They may sometimes be secured in considerable numbers by sifting leaves.

In addition to the similarity in many features of habit, the species of these four genera likewise have much in common in general appearance and structure. The genera are, however, readily separated upon critical examination. The discrimination of the species has presented more difficulty. Heretofore the species have remained practically unknown, not only because of the paucity of material in collections, but especially because the characters studied and given in descriptions are, in the main, not truly specific, being either generic in extent or common to a number of species. More detailed and careful study and comparison of the material in extensive collections made by the author personally in various parts of the country has revealed the considerable number of species here described.

The four genera may readily be separated by means of the following key.

Key to the Genera.

a. Articles of antennae from 25 to 35, the number being mostly near 32. Posterior legs of ♂ without special processes or lobes. (Posterior coxae wholly unarmed).

b. Dorsal spines of anal and penult legs 0, 0, 1, 0, 0, ventral 0, 1, 1, 1, 0. *Sigibius*, gen. nov.

bb. Dorsal spines of anal legs 0, 0, 2, 0, 0, ventral 0, 1, 3, 1, 0, or 0, 1, 3, 2, 0; dorsal spines of penult legs 0, 0, 3, 1, 0, or 0, 0, 3, 1, 1, ventral 0, 1, 3, 3, 1 or 0, 1, 2, 3, 1. *Tidabius*, gen. nov.

aa. Articles of antennae normally 20. Either anal or penult legs of ♂ with a special lobe. (Coxae armed or unarmed).

b. Posterior coxae wholly unarmed; median incision of prosternum semicircular; penult legs of ♂ always bearing at distal end of tibia on dorsal side a small but conspicuous lobe, the anal legs without lobes or crests; posterior angles of 11th and 13th or at least of 13th more or less produced. *Nampabius*, gen. nov.

bb. Last 3 or 4 pairs of coxae dorsally armed; median incision of prosternum V-shaped; penult legs of ♂ without any such lobe, but anal legs bearing at distal end of tibia a small crest; posterior angles of none of the dorsal plates at all produced. *Garibius*, gen. nov.

Nampabius, gen. nov.

Body conspicuously attenuated cephalad, with the first dorsal plate much narrower than the head and also narrower than the third plate. Mostly robust, varying from 6 to 8.5 times as long as the width of the 10th plate.

Antennae short; composed of 20 articles.

Ocelli in 2, or, less commonly, in 3, longitudinal series; the single ocellus mostly a little smaller than the most caudal one of the dorsal series.

Prosternal teeth 2+2. Median incision semicircular in outline, never acute at bottom. (Plate 1, fig. 2).

Eleventh and thirteenth dorsal plates with the caudal angles more or less produced or sometimes that of thirteenth alone distinctly extended; angles of other plates straight or excised.

Claw of the female gonopods tripartite, with the lobes subequal or

the median longest, all usually more or less rounded distally. Basal spines 2+2, long and usually slender, the sides, as seen in ventral view, converging to near the apex or beginning of the acuminate distal portion which is very short. (Plate 2, fig. 6).

Coxal pores very small; circular, 2, 2, 2, 2 to 2, 3, 3, 3 in number.

Ventral spines of the anal legs 0, 1, 1, 0, 0 or 0, 1, 1, 1, 0; dorsal 0, 0, 0, 0, 0 or 0, 0, 2, 0, 0; claws 2 or, rarely, but 1. Ventral spines of penult legs 0, 1, 1, 1, 0 or 0, 1, 2, 1, 0; dorsal spines 0, 0, 0, 0, 0 or 0, 0, 2, 0, 0; claws 2 or, rarely, but 1. Ventral spines of thirteenth legs 0, 0, 2, 1, 1 to 0, 0, 0, 1, 1; dorsal from 0, 0, 0, 0, 0 to 0, 0, 2, 1, 1. Ventral spines of twelfth legs from 0, 0, 0, 0, 1 to 0, 0, 0, 2, 1; dorsal from 0, 0, 0, 0, 0 to 0, 0, 2, 1, 2. Ventral spines of eleventh legs 0, 0, 0, 0, 1 to 0, 0, 0, 2, 1; dorsal from 0, 0, 0, 0, 1 to 0, 0, 0, 2, 2. First two to first four pairs of legs with no ventral spines on any joint; and the third joint of the first twelve or thirteen pairs of legs ventrally unarmed. The posterior coxae are wholly unarmed.

Anal legs in the male short; moderately and uniformly inflated; without special lobes or furrows. Penult legs with the fifth article produced at its distal end on the dorsal or dorsomesal side into a small subcylindric or distally expanded lobe bearing a number of sensory hairs.

Type.— *N. virginiensis*, sp. nov.

Distribution.— Eastern and Southeastern States, in the latter section occurring chiefly in or near the mountainous parts.

The species of this genus are the smallest members of the family, all known forms being under 7.5 mm. in length. In proportions they are mostly relatively robust and conspicuously narrowed cephalad. They vary considerably in color, some being testaceous, some ferruginous, and others chestnut. While the head may be paler than the dorsum, it is usually darker, frequently being a shining reddish black. As in Tidabius, the posterior legs, especially distally, are nearly always more brightly pigmented, being commonly bright yellow or orange. These forms occur commonly in and beneath layers of fallen leaves and loose piles of sticks.

The following key will aid in the identification of the known species.

Key to species of Nampabius.

a. Neither the anal nor the penult legs with any dorsal spines. Ventral spines of anal legs 0, 1, 1, 0, 0.
N. fungiferopes (Chamberlin).

aa. Anal and penult legs with the third joint armed with 2 dorsal spines.

b. Dorsal spines of twelfth legs 0, 0, 2, 1, 2; (ventral spines of ninth to twelfth legs 0, 0, 0, 2, 1). *N. virginiensis*, sp. nov.

bb. Dorsal spines of twelfth legs not 0, 0, 2, 1, 2.

c. Third joint of twelfth legs unarmed dorsally (spines 0, 0, 0, 1, 2 or fewer).

d. Dorsal spines of twelfth legs 0, 0, 0, 0 (1), 1; of the eleventh 0, 0, 0, 1, 1. *N. parienus*, sp. nov.

dd. Dorsal spines of twelfth legs 0, 0, 0, 1, 2; of the eleventh 0, 0, 0, 1, 2 or 0, 0, 0, 2, 2.

e. Dorsal spines of tenth and eleventh legs 0, 0, 0, 1, 2; ventral spines of thirteenth legs 0, 0, 1, 1, 1. *N. embius*, sp. nov.

ee. Dorsal spines of eleventh legs 0, 0, 0, 2, 2; ventral spines of thirteenth legs 0, 0, 2, 1, 1.

f. Ventral spines of twelfth legs 0, 0, 1, 2, 1; of eighth to eleventh 0, 0, 0, 2, 1; ocelli cir. 6 in two series. *N. inimicus*, sp. nov.

ff. Ventral spines of twelfth legs 0, 0, 0, 1, 1; of eighth to eleventh also 0, 0, 0, 1, 1; ocelli 10 or more in three series. *N. georgianus*, sp. nov.

cc. Third joint of twelfth legs armed with one or two dorsal spines.

d. Dorsal spines of twelfth legs 0, 0, 1, 1, 2 or 0, 0, 2, 1, 1; of tenth and eleventh 0, 0, 0, 2, 2. *N. carolinensis*, sp. nov.

dd. Dorsal spines of twelfth legs 0, 0, 2, 1, 0 or 0, 0, 2, 1, 1; of tenth and eleventh 0, 0, 0, 0, 1 or 0, 0, 0, 1, 1.

e. Dorsal spines of twelfth and thirteenth legs 0, 0, 2, 1, 0; of eleventh 0, 0, 0, 1, 1. *N. tennesseensis*, sp. nov.

ee. Dorsal spines of twelfth and thirteenth legs 0, 0, 2, 1, 1; of eleventh 0, 0, 0, 0, 1.

f. Near 8.5 times longer than width of tenth plate. *N. longiceps*, sp. nov.

ff. Not more than 7 times longer than width of tenth plate. *N. lulae*, sp. nov.

NOTE.— The key does not include *N. lundii* (Meinert) the insufficient description of which must leave its identity in doubt until the types can be restudied. See further under the account of this species.

Nampabius fungiferopes (Chamberlin).

Lithobius fungiferopes Chamberlin, Proc. Acad. nat. sci. Phil., 1904, **56**, p. 652.

Diagnosis.— Dorsum testaceous to dark, more or less reddish brown, in life more or less suffused with purplish. Head darker, almost black, in front of suture paler and with a tendency toward ferruginous.

Body about $6\frac{3}{4}$ times longer than width of tenth plate.

Head considerably wider than long.

Ocelli mostly 4 to 6 in two series.

Prosternum about 1.54–1.6 times wider than long; distance between chitinous spots about 2.3–2.4 times greater than width at median incision and 3.8 or 3.9 times the dental line.

First dorsal plate about 1.9 times wider than long.

Coxal pores 2, 2, 2, 2.

Claw of female gonopods short and wide with the median lobe considerably largest, the lateral equal. Spines of moderate width, the sides converging distad to the short, abruptly subacute apex.

Twelfth to anal legs inclusive with no dorsal spines. Ventral spines of anal 0, 1, 1, 0, 0; of penult, 0, 1, 1, 1, 0. Ventral spines of ninth to thirteenth legs (also of fifth to ninth) inclusive 0, 0, 0, 0, 1. Dorsal spines of tenth and eleventh legs (also of second to tenth) 0, 0, 0, 0, 1.

Process of the penult legs in the male conspicuously expanding distad; bearing the usual hairs. Tarsal joints abruptly and considerably more slender than the tibia. (Plate **1**, fig. 6–7).

Description.— Above testaceous to dark, more or less reddish, brown, in life especially commonly conspicuously suffused with violaceous or purplish. Head deeper in color, almost black, but paler in front of suture where it may show a tendency toward ferruginous. Antennae rufous distally, proximally brown or purplish brown. Prosternum dark brown with the prehensorial feet lighter. Venter light brown or testaceous, in life suffused with purplish. Legs pale brown, in life of a distinctly purplish or violaceous tinge proximally, being yellow distally; posterior pairs more strongly pigmented as usual, bright yellow except proximally.

Body strongly attenuated cephalad of tenth plate as usual. Proportionately robust, being mostly 6.75+ times longer than width of tenth plate. The widths of head and first, third, eighth, tenth, and twelfth plates to each other as 37: 31: 33: 42: 42: 39.

Head wider than long (mostly from 37:34 to 37:36); widely rounded anteriorly. Hairs long and sparse.

Antennae short; composed of the normal twenty articles, all of which are short. Hairs of moderate length, not very dense, more sparse proximally.

Eyes composed mostly of from 4 to 6 ocelli which are arranged in two series: — thus, 1+2, 1 to 1+3, 2. The single ocellus smaller than most of the others. All ocelli well pigmented.

Prosternum 1.54–1.6 times wider than long. Distance between chitinous spots near 2.38 times the width at level of bottom of mesal incision; about 3.87 times the dental line, the anterior portion being more strongly narrowed than in the related species. Median incision shallow, not large, of the usual semicircular form. Teeth small and acute, equal or nearly so, the interval between each pair narrow and well rounded at bottom. Sides slanting directly from close to base of each ectal tooth, nearly straight, being slightly concave near middle of length.

First dorsal plate widest at anterior end, the sides at first but little and then more strongly converging caudad and rounding in about the caudal corners; nearly 1.9 times wider than long. Posterior corners of the eleventh and more distinctly of the thirteenth plates weakly produced, those of the ninth straight.

Coxal pores small and circular; mostly 2, 2, 2, 2.

Spines of first legs $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 0,\ 0,\ 0}$; of second to fourth inclusive $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of fifth to eleventh inclusive $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of twelfth and thirteenth, $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 0,\ 0,\ 1}$; of the penult $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, the claws 2; of the anal $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 1,\ 1,\ 0,\ 0}$, claws 2, the accessory claw easily lost from preserved specimens in both anal and penult pairs.

In the male the anal and penult legs are short and but moderately inflated; longitudinally sulcate along ectal or anterior side, more distinctly so on fourth and fifth articles. In the penult legs the tarsal joints are abruptly and considerably more slender than the tibia; tibia with the distal mesodorsal corner obliquely complanate and there bearing the usual small process, this being in this species conspicuously widened at the distal end (see Plate 1, fig. 6 and 7) and bearing on its distal surface the usual sensory hairs.

Claw of female gonopods short and relatively wide, scarcely curved; tripartite, the middle lobe considerably larger than the two lateral which are about equal, all lobes distally narrowly rounded. Spines

moderately wide, with the sides converging from base distad, toward ends more abruptly bending in to the acute or subacute apex. Mesal side of first article of gonopods nearly straight and parallel with its fellow.

Length from 5 to nearly 7 mm.

Type Locality.— New York (Ithaca!).

Localities.—New York (Ithaca!); Vermont (Jamaica! Grout's Mill!).

Nampabius virginiensis, sp. nov.

Diagnosis.— Dorsum testaceous to dark reddish or ferruginous brown. Head more or less ferruginous, darker caudad of suture.

Body robust, being mostly but 6.25 or 6.3 times longer than width of the tenth plate.

Head equal in length and breadth; cordate.

Ocelli mostly 6 or 7 in two series.

Prosternum about 1.63 times wider than long, the anterior portion being short. Distance between chitinous spots only 1.7 times greater than width at median incision and but 2.9 times greater than the dental line.

First dorsal plate nearly 1.9 times wider than long.

Coxal pores 2, 2, 2, 2–2, 3, 3, 3.

Claw of female gonopods with the outer latest tooth somewhat smaller than the inner. Spines long, their sides moderately converging to near apex where curving in more abruptly to the acute apex.

Dorsal spines of anal and of penult legs 0, 0, 2, 0, 0; ventral spines of these legs 0, 1, 1, 1, 0. Dorsal spines of thirteenth legs 0, 0, 2, 1, 0; ventral 0, 0, 2, 1, 1. Dorsal spines of twelfth legs 0, 0, 2, 1, 2. Dorsal spines of tenth and eleventh legs 0, 0, 0, 2, 2. Ventral spines of ninth to twelfth legs inclusive 0, 0, 0, 2, 1.

Process of penult legs of male subcylindric; expanded somewhat distally, flat-topped and on the distal surface bearing a subdense patch of moderately long sensory hairs. (Plate **1**, fig. 4–5).

Description.— Dorsally testaceous to dark reddish or ferruginous brown, more reddish anteriorly and posteriorly. Head more or less ferruginous, darker, dusky, caudad of the suture. Antennae like the head; pale at tips. Prosternum brown, with the prehensorial feet paler. Venter pale yellowish to light reddish brown, the caudal plates darker. Legs pale yellow to testaceous, with the posterior pairs, excepting at base, bright yellow or somewhat orange.

Body attenuated as usual. Typically near 6.25 or 6.3 times longer than width of the tenth plate. A female 5 mm. long has the widths of head and first, third, eighth, tenth, and twelfth plates to each other as 37:33:35:42:42:42.

Head nearly equal in length and breadth. Cordate; widest a little in front of marginal breaks from where it narrows continuously forwards.

Antennae very short; moderately attenuated. Composed of the usual twenty articles which are short and very short; decreasing distad from the second.

Eyes composed mostly of 6 or 7 ocelli arranged in 2 series:— thus 1+3, 2 or 1+4, 2. Dark. The most caudal ocellus of upper row considerably larger than the single one, the first of lower row less markedly larger.

Prosternum about 1.63 times wider than long. Distance between chitinous spots only 1.7 times greater than width at level of bottom of mesal incision which is nearly in line with caudal ends of lateral slopes; 2.9 times longer than the dental line which is also thus longer than usual. Median incision large and conspicuous, of the usual form. Teeth subequal, small and acute, the interval between each pair semicircular; line of apices recurved. Sides straight or a little incurved, short.

First dorsal plate widest at anterior end from where the sides converge caudad considerably; nearly 1.9 times wider than long. Thirteenth dorsal plate with posterior corners moderately produced, those of the eleventh less so as usual; caudal margin of ninth plate straight.

Coxal pores small; 2, 2, 2, 2 to 2, 3, 3, 3.

Spines of the first legs $\frac{0,0,0,0,0-0,0,0,0,1}{0,0,0,0,1}$; of the second $\frac{0,0,0,0,1}{0,0,0,0,0}$; of the third to seventh inclusive, $\frac{0,0,0,1,1}{0,0,0,0,1}$; of the eighth $\frac{0,0,0,1,2}{0,0,0,1,1}$; of the ninth, $\frac{0,0,0,1,2}{0,0,0,2,1}$; of the tenth and eleventh, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the thirteenth $\frac{0,0,2,1,0}{0,0,2,1,1}$; of the penult $\frac{0,0,2,0,0}{0,1,1,1,0}$; of the anal $\frac{0,0,2,0,0}{0,1,1,1,0}$.

In the male the anal legs are short, moderately and uniformly inflated, and without special modifications. Penult legs similar to anal but the fifth article obliquely complanate at distal end on mesodorsal side and there bearing the usual small lobe which is subcylindric and somewhat expanded distad, especially on side toward distal end of leg; sensory hairs borne on distal surface of lobe rather long and subdense. (Plate 1, fig. 4–5).

Claw of female gonopods of moderate size; considerably curved; tripartite; the inner and median teeth not much different in size, the outer one smaller. Spines rather long, the sides as usual converging from base distad, toward end more strongly curving in to meet at the acute apex. Inner side of first article nearly straight, a little diverging from its fellow proximad. Length near 5 mm.

Type Locality.— Virginia (Natural Bridge! August, 1910).

Localities.— Virginia (Natural Bridge!); Tennessee (Unaka Springs!).

Nampabius parienus, sp. nov.

Diagnosis.— Dorsal spines of anal, penult, and thirteenth legs 0, 0, 2, 0, 0. Ventral spines of anal leg 0, 1, 1, 1, 0, of penult 0, 1, 1, 1, 0–0, 1, 2, 1, 0; of ninth to thirteenth, 0, 0, 0, 1, 1. Dorsal spines of tenth and eleventh pairs of legs (as also of the second or third to ninth) 0, 0, 0, 1, 1.

Ocelli 5 or 6 in two series.

Prosternum 1.57 or 1.6 times wider than long. Distance between chitinous spots about 3.6 times greater than the distal line; 2.25 times longer than the width at median incision.

Coxal pores 2, 2, 2, 2–2, 3, 3, 2.

Process of tibia of penult legs in male rather long and slender, in proximal aspect with lateral lines parallel; in lateral aspect appearing thicker and projecting over base on side at distal end of article; sensory hairs long and slender.

Body 7.7 or 7.75 times longer than width of tenth plate.

Head broadly subcordate; distinctly wider than long.

First dorsal plate (in type) between 1.75 and 1.8 times wider than long.

Dorsum yellow with the caudal plates tinged with orange. Head orange, with the frontal region paler.

Description.— The body above is yellow with the caudal plates tinged with orange. Head orange, the frontal region paler, more yellowish. Antennae orange, yellow at tips. Prosternum orange brown. Venter pale, the caudal plates more strongly pigmented as usual. Legs pale excepting the posterior pairs which are bright orange.

Body more slender than in most related species, in the type being 7.73 times longer than the width of the tenth dorsal plate. Width of head and first, third, eighth, tenth, and twelfth plates to each other about as 36: 32: 35: 43: 44: 41.

Head broadly subcordate, considerably bulging caudad of eyes. Clearly wider than long (12: 11). Hairs short and sparse.

Antennae short. Articles short and very short, decreasing distad of the second as usual. Hairs short and not dense.

Eyes typically composed of five or six ocelli in two series: — thus, 1+2, 2 or 1+3, 2. Single ocellus smaller than the first one of upper row and the others of the usual relative sizes.

Prosternum in type 1.57 times wider than long. Distance between chitinous spots 3.6 times the dental line; 2.25 times width at level of bottom of median incision. Median incision of the usual semicircular form, rather small, the distance across it between the two mesal teeth not greater than that between the teeth of each pair. Teeth moderate; line of apices distinctly and considerably recurved. Spine at base of ectal tooth; slender, somewhat curved mesad distally, not exceeding the tooth in length.

First dorsal plate widest near anterior end, the sides from there at first slightly and then more strongly converging caudad; plate in type 1.77+ times wider than long. Posterior corners of the eleventh and thirteenth dorsal plates a little produced, those of the ninth straight or also showing a very slight tendency toward production, rounded; other minor plates with corners oblique or rounded.

Coxal pores very small; 2, 2, 2, 2–2, 3, 3, 2.

Spines of first legs, $\frac{0.\ 0.\ 0.\ 0.\ 1.}{0.\ 0.\ 0.\ 0.\ 0}$; of second, $\frac{0.\ 0.\ 0.\ 0\ \ (1).\ 1}{0.\ 0.\ 0.\ 0.\ 0}$; of third, $\frac{0.\ 0.\ 0.\ 1.\ 1.}{0.\ 0.\ 0.\ 0.\ 0}$; of the fourth to seventh, $\frac{0.\ 0.\ 0.\ 1.\ 1.}{0.\ 0.\ 0.\ 0.\ 1}$; of the ninth to eleventh, $\frac{0.\ 0.\ 0.\ 1.\ 1}{0.\ 0.\ 0.\ 1.\ 1}$; of the twelfth, $\frac{0.\ 0.\ 0\ \ 0\ \ (1).\ 1}{0.\ 0.\ 0.\ 1.\ 1}$, the dorsal spine of the fifth article being on the cephalic side; of the thirteenth, $\frac{0.\ 0.\ 2.\ 0.\ 0.}{0.\ 0.\ 0.\ 1.\ 1}$; of the penult, $\frac{0.\ 0.\ 2.\ 0.\ 0}{0.\ 1.\ 1.\ 1.\ 0-0.\ 1.\ 2.\ 1.\ 0}$, claws 2; of the anal, $\frac{0.\ 0.\ 2.\ 0.\ 0}{0.\ 1.\ 1.\ 1.\ 0}$, claws 2.

In the male the anal and penult legs are short and uniformly and but little inflated; both are laterally longitudinally sulcate. The process at the distal end of the tibia of the penult legs is rather long and slender; when viewed from proximal aspect of leg its sides appear nearly parallel; in lateral aspect the process is somewhat thicker and projects distad above its base; distal surface rising obliquely dorso-distad from its proximal end to its distal; sensory hairs long and slender. (Plate 3, fig. 1–2).

Length (type) 6.5 mm.; width of tenth plate .84 mm.; length of antennae 2 mm.

Locality.— North Carolina (Hot Springs!).

Nampabius embius, sp. nov.

Diagnosis.— Dorsal spines of the anal and penult legs 0, 0, 2, 0, 0. Dorsal spines of the thirteenth legs 0, 0, 2, 1, 0; ventral 0, 0, 1, 1, 1. Dorsal spines of the tenth to twelfth legs 0, 0, 0, 1, 2; ventral 0, 0, 0, 2, 1. Dorsal spines of the sixth to ninth legs also 0, 0, 0, 1, 2.

Ocelli 6 to 8 in two series.

Prosternum about 1.56 times wider than long. Distance between chitinous spots 2.14 times width at median incision; $3\frac{1}{3}$ times the dental line.

Spines of the gonopods rather long; sides parallel or but slightly converging from base to the very short acuminate tip, the sides of which are straight and meet at an almost obtuse angle.

Body more slender than in most related species being (in type) about $8\frac{1}{3}$ times longer than the width of the tenth dorsal plate.

Head clearly wider than long.

First dorsal plate near 1.75 times wider than long.

Dorsum brown of dilute chestnut caste. Head dark brownish red.

Description.— Brown of dilute chestnut caste. Head dark brownish red. Antennae brown, pale distally. Prosternum dark, more brownish than the head with the prehensorial feet paler. Venter pale brown, the caudal plates darker. Legs colored nearly like the corresponding plates of venter; posterior pairs light distad.

Body comparatively slender being in the type $8\frac{1}{3}$ times longer than the width of the tenth plate. Widths of head and of the first, third, eighth, tenth, and twelfth plates to each other about as 39: 35: 38: 48: 49: 47.5.

Head wider than long in ratio 13: 12; widest behind eyes from where the convergence of the sides to the caudal corners is marked.

Antennae short as usual. Moderately attenuated. The twenty articles short and very short, decreasing regularly distad. Hairs of moderate length, short, not dense. (Plate **2**, fig. 7).

Eyes composed of 6 to 8 ocelli in two series:— thus, 1+3, 3 — 1+4, 3 — 1+3, 2. Ocelli of moderate size, black.

Prosternum 1.56 times wider than long. Distance between chitinous spots 2.14 times width at level of bottom of mesal incision; $3\frac{1}{3}$ times the dental line. Mesal incision wide and shallow, of the usual form at bottom. Teeth small, distally narrowly rounded; line of apices rather strongly recurved. Spine unusually long, bristle like.

First dorsal plate widest a little caudad of anterior end from where

the sides converge considerably; 1.75 times wider than long. Posterior corners of the thirteenth plate a little produced; those of the eleventh nearly straight and those of ninth rounded cephalad.

Coxal pores small and circular as usual, 2, 3, 3, 3.

Spines of first pair of legs, $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 0,\ 0,\ 0}$ to $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of second and third, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of fourth and fifth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of sixth, $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 0,\ 1,\ 1}$ or $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 0,\ 0,\ 1}$; of seventh, $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 0,\ 1,\ 1}$; of tenth to twelfth, $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 0,\ 1,\ 1,\ 1}$; of the penult, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, claws 2; of the anal 0, 0, 2, 0, 0.

Claw of female gonopods of moderate size; distinctly tripartite. Spines rather long, with sides parallel or but slightly converging from base to acuminate apical portion which, as usual, is relatively very short with sides strictly straight and running to an almost obtuse angle. Inner side of first article of gonopod considerably diverging proximad from its fellow. Sternite mesally straight, with no distinct process.

Length (type) 7.5 mm., width of tenth plate .91 mm.; length of antenna, 2 mm.

Locality.— South Carolina (Taylors!).

Nampabius inimicus, sp. nov.

Diagnosis.— Dorsal spines of penult legs 0, 0, 2, 0, 0; ventral 0, 1, 2, 1, 0. Dorsal spines of thirteenth legs, 0, 0, 2, 1, 0; ventral, 0, 0, 2, 1, 1. Dorsal spines of twelfth legs, 0, 0, 0, 1, 2; ventral, 0, 0, 1, 2, 1. Dorsal spines of tenth and eleventh legs, 0, 0, 0, 2, 2. Ventral spines of tenth and eleventh (as also of eighth and ninth) legs, 0, 0, 0, 2, 1.

Ocelli (in type) 6 in two series.

Prosternum about 1.57 times wider than long. Distance between chitinous spots 2.1 times the width at median incision; 3.1 times as great as the dental line.

Coxal pores 2, 2, 2, 2–2, 3, 3, 2.

Body about 7.8 times longer than width of tenth dorsal plate.

Head subrotund, considerably wider than long.

First dorsal plate 1.7 times wider than long.

Process of penult legs in male small, cylindric proximally but expanded at distal end on side toward distal end of joint; sensory hairs short and spinescent. (Plate **3**, fig. 5–6).

Dorsum light testaceous, the caudal plates of ferruginous tinge. Head dark orange.

DESCRIPTION.— Dorsum light testaceous, the caudal plates of ferruginous or orange tinge. Head dark orange. Antennae reddish brown, light at tips. Prosternum brown. Venter very pale, excepting the caudal plates which are orange. Legs pale like the venter, but the posterior pairs more brightly pigmented as usual.

Body more slender than typical in the genus the length of type specimen being 7.77+ times greater than the width of the tenth plate. Width of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other as 39:34:37:46:47:43 (♂).

Head subrotund; considerably wider than long (39:35); the sides convexly bulging caudad of eyes; widely rounded cephalad.

Antennae moderately short. Joints short, decreasing markedly in size from the second distad. Sides of articles straight, moderately flaring distad. Hairs moderately short, not very dense.

Eyes in type composed of 6 ocelli in two series:— thus, 1+3, 2. Single ocellus of about same size as the first one of upper series or a very little smaller; others decreasing in size cephalad.

Prosternum 1.57+ times wider than long. Distance between chitinous spots 2.1 times width at level of bottom of median incision; 3.1 times the dental line. Lateral edges nearly straight or very slightly convex cephalad and slightly bending ectad at posterior end. Median incision wide, semicircular as usual; the interval between the two mesal teeth decidedly greater than that between the teeth of each lateral pair. Teeth acute; line of apices distinctly recurved.

First dorsal plate 1.7 times wider than long; widest near middle, the sides converging cephalad and, more conspicuously, caudad. Posterior angles of eleventh and thirteenth dorsal plates a little produced as usual, those of the other minor plates oblique or simply rounded.

Coxal pores very small and circular; 2, 2, 2, 2–2, 3, 3, 2.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of the second, $\frac{0,\ 0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$ or $\frac{0,\ 0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; ventral spines of fourth and fifth, 0, 0, 0, 0, 1 and of the sixth the same or else 0, 0, 0, 1, 1; spines of seventh legs, $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 0,\ 1,\ 1}$; of eighth and ninth, $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ of tenth and eleventh, $\frac{0,\ 0,\ 0,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of twelfth, $\frac{0,\ 0,\ 0,\ 1,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 0,\ 2,\ 1,\ 1}$; of the penult, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 2,\ 1,\ 0}$; anal lost.

Penult legs of male short and uniformly inflated. Process at distal

end of tibia small, cylindric at base and expanded at free end on side toward distal end of joint; process extending dorsodistad or also a little caudad; sensory hairs on distal surface of process short and spinescent. (Plate **3**, fig. 5–6).

Length of type 7 mm.; width of tenth plate .9 mm.; length of antenna, 2.3 mm.

Locality.— Tennessee (Russellville!).

Nampabius georgianus, sp. nov.

Diagnosis.— Dorsal spines of anal and penult legs 0, 0, 2, 0, 0; ventral 0, 1, 1, 1, 0. Dorsal spines of thirteenth legs 0, 0, 2, 1, 0; ventral 0, 0, 2, 1, 1. Dorsal spines of twelfth legs, 0, 0, 1, 2; ventral, 0, 0, 0, 1, 1. Dorsal spines of eleventh legs, 0, 0, 0, 2, 2; of the tenth, 0, 0, 0, 1, 2. Ventral spines of tenth and eleventh legs (as also of the sixth to ninth) 0, 0, 0, 1, 1.

Ocelli 10–12 in three series.

Prosternum 1.5 times wider than long; distance between chitinous spots only 3.1 times as great as dental line; about $2\frac{1}{3}$ times as great as width at median incision.

Body 6.6 to nearly 7 times longer than width of tenth dorsal plate.

Head much wider than long.

First dorsal plate twice as wide as long or nearly so.

Process of tibia of penult leg of male small and subcylindric, (Plate **2**, fig. 2).

Dorsum testaceous. Head light ferruginous; frontal region palest.

Description.— Dorsum testaceous. Head somewhat light ferruginous with caudal portion covered with a darker brown area, leaving the frontal region palest. Antennae somewhat pale ferruginous brown, lighter at tips. Prosternum brown of more or less reddish caste, the prehensorial feet paler. Venter pale yellow, with the caudal plates darker. Legs like adjoining part of venter with caudal pairs somewhat brighter, distally.

Body strongly narrowed cephalad, moderately robust, being from 6.6 to 6.9 times longer than width of the tenth plate, being thus relatively more slender than in *N. virginiensis*. Widths of head and of first, third, eighth, tenth, and twelfth plates as 37 : 34 : 38 : 46 : 48 : 43.

Head much wider than long (average ratio about 33.5 : 29.5), being wider by from $\frac{1}{8}$th to $\frac{1}{10}$th. Broadest a little back of eyes where it bulges considerably on each side. Broad anteriorly, not subcordate

as in *virginiensis*. Hairs moderately short, very sparse. (Plate 3, fig. 8).

Antennae short and but moderately attenuated. Articles, as usual, 20, which are short though rather longer than in *virginiensis* and also less closely telescoped; decreasing distad from the second. Hairs moderately short, not especially dense.

Eyes composed of ten to twelve ocelli arranged in three series:— thus 1+4, 4, 3−1+4, 3, 3. Ocelli black; closely but somewhat irregularly arranged.

Prosternum 1.5 times wider than long. Distance between chitinous spots 3.1 times as great as the length of dental line; about $2\frac{1}{3}$ times the width at level of bottom of median incision which is clearly farther cephalad of caudal ends of lateral slopes than in *virginiensis*. Sides or slopes of anterior portion straight, slanting directly ecto-caudad from the teeth. Teeth small and acute. Median incision conspicuous, of the usual semicircular form.

First dorsal plate widest at anterior end, the sides at first moderately converging and then strongly rounding in about the caudal corners; about twice as wide as long. Ninth plate with caudal margin bent forward a little at ends. Eleventh plate with caudal margin straight all the way across or very nearly so. Thirteenth plate with caudal corners a little produced.

Coxal pores small; 2, 2, 2, 2.

Spines of first legs, $\frac{0, 0, 0, 0, 0}{0, 0, 0, 0, 0}$; of second, $\frac{0, 0, 0, 0, 1}{0, 0, 0, 0, 0}$, 1; of third, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 0, 0}$; of fourth and fifth, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 0, 1}$; of sixth, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 1, 1}$; of eighth to tenth inclusive, $\frac{0, 0, 0, 1, 2}{0, 0, 0, 1, 1}$; of eleventh, $\frac{0, 0, 0, 2, 2}{0, 0, 0, 1, 1}$; of twelfth, $\frac{0, 0, 0, 1, 2}{0, 0, 0, 1, 1}$; of thirteenth, $\frac{0, 0, 2, 1, 0}{0, 0, 2, 1, 1}$; of penult and anal, $\frac{0, 0, 2, 0, 0}{0, 1, 1, 1, 0}$, each with two claws.

In the male the anal legs are short; uniformly and but little crassate. (Plate 2, fig 3). Penult legs similar to anal but bearing the characteristic lobe at distal end of the fifth joint, or tibia; lobe small and subcyclindric, proportionately longer than in *virginiensis* (Plate 2, fig. 1–2); extending in a mesodorsal and somewhat distal direction, bearing on the free surface a limited number of rather short sensory hairs.

Length 5 to 6.25 mm.

Locality.— Georgia (Tallulah Falls!).

Nampabius carolinensis, sp. nov.

Diagnosis.— Dorsal spines of the anal and penult legs, 0, 0, 2, 0, 0; ventral of penult, 0, 1, 2, 1, 0, of anal 0, 1, 1, 1, 0. Dorsal spines of thirteenth legs, 0, 0, 2, 1, 0; ventral, 0, 0, 2, 1, 1. Dorsal spines twelfth legs, 0, 0, 1, 1, 2. Dorsal spines of tenth and eleventh legs, 0, 0, 0, 2, 2. Ventral spines of ninth to twelfth (as also of seventh and eighth) legs, 0, 0, 0, 1, 1.

Ocelli near 6 in number, in two series.

Prosternum 1.6 times wider than long. Distance between chitinous spots only 2.1 times width at median incision; 3.5 times as great as dental line.

Body near eight times longer than width of tenth plate.

Head conspicuously wider than long.

First dorsal plate near 1.7+ times wider than long.

Process of tibia of penult leg in male relatively slender and moderately long, broadening at base but not distally where it is rounded. Hairs at distal end straight and divergent. (Plate **2**, figs. 4–5).

Dorsum yellowish, uniform. Head reddish orange.

Description.— Dorsum yellowish, uniform. Head reddish orange. Antennae brown, pale distally. Prosternum somewhat paler than head, the prehensorial feet still lighter. Venter light yellow, the caudal plates orange. Legs nearly like corresponding plates of venter.

Body moderate, being 7.9 or 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other as 36: 31: 34: 42: 43: 41.

Head conspicuously wider than long (9: 8), widely rounded in front of eyes; sides well rounded caudad of eyes. Hairs of moderate length and sparse, as usual.

Antennae short and moderately attenuated. Articles beyond the second short and very short, decreasing distad. Clothed as usual.

Eyes composed of about 6 ocelli arranged in two series: — thus, 1+3, 2. Ocelli distinct, regular in form and arrangement.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.1 times width at median incision; 3.5 times the dental line. Median incision wide and shallow, strictly semicircular in form. Teeth small, the outer of each pair rather larger than the inner, the interval between the two well rounded; line of apices strongly recurved. Spine contiguous with base of outer tooth, fine. Lateral

margin of anterior portion beginning at spine and sloping ectocaudad; a little convex, bent ectad near caudal end for a short distance.

First dorsal plate 1.72 times wider than long; sides convex, widest a little in front of middle of length. Posterior angles of thirteenth plate a little produced; those of the eleventh slightly more so. Caudal margin of other minor plates more or less bent forwards at ends; or corners of the ninth obliquely excised.

Coxal pores small and circular; 2, 2, 2, 2.

Spines of first to third legs inclusive, $\frac{0, 0, 0, 0, 1}{0, 0, 0, 0, 0}$; of fourth and fifth, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 0, 1}$; of sixth, $\frac{0, 0, 0, 1, 2}{0, 0, 0, 0, 1}$; of seventh and eighth, $\frac{0, 0, 0, 1, 2}{0, 0, 0, 1, 1}$; of tenth and eleventh, $\frac{0, 0, 0, 2, 2}{0, 0, 0, 1, 1}$; of twelfth, $\frac{0, 0, 1, 1, 2}{0, 0, 0, 1, 1}$; of thirteenth $\frac{0, 0, 2, 1, 0}{0, 0, 2, 1, 1}$; of penult, $\frac{0, 0, 2, 0, 0}{0, 1, 2, 0, 1}$, claws; of the anal, $\frac{0, 0, 2, 0, 0}{0, 1, 1, 1, 0}$, armed with two claws.

In the male the anal legs are short and moderately, uniformly inflated. The penult legs are similar excepting for the tibial lobe; lobe a relatively slender and moderately long cylindric process which widens at base but distally is rounded and not at all expanded; distal hairs straight and divergent.

Length of type 6.5 mm.

Locality.— South Carolina (Landrum! August, 1910).

Nampabius tennesseensis, sp. nov.

Diagnosis.— Dorsal spines of anal and penult legs 0, 0, 2, 1, 0; ventral, 0, 1, 1, 1, 0. Dorsal spines of twelfth legs, 0, 0, 2, 1, 0. Dorsal spines of tenth and eleventh legs (as also of the first to ninth), 0, 0, 0, 1, 1. Ventral spines of ninth to twelfth legs (as also of the fifth or sixth to eighth), 0, 0, 0, 1, 1.

Ocelli 8 or 9 in two or three series.

Prosternum 1.54 times wider than long. Distance between chitinous spots $2\frac{1}{3}$ times width at median incision; 3.5–3.8 times the dental line.

Body eight times longer than width of tenth plate.

Head wider than long.

Process of tibia of penult legs of male flattened in a distoectal proximomesal direction; considerably longer along base than the height above same; expanded at distal end. (Plate 3, fig. 3–4).

Dorsum pale chestnut. Head darker chestnut, shining.

Description.— Dorsum pale chestnut. Head a deeper, shining

chestnut. Antennae chestnut, excepting the tips which are lighter. Prosternum rather more brownish than the head, with the prehensorial feet lighter and at tips somewhat light ferruginous. Venter pale; the anterior plates suffused with purplish; the caudal plates burnt brown. Legs pale, excepting the posterior pairs which are brown or brownish orange.

Body moderate, in the male type being near eight times longer than wide. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36: 30: 32: 41: 42: 40.

Head wider than long in ratio 12: 11; not varying much in width between eyes and level of marginal breaks; broadly rounded cephalad. Hairs short and sparse.

Antennae short as in related species. Moderately attenuated. Articles short, decreasing distad. Hairs on proximal articles rather sparse, becoming denser distad.

Eyes composed of eight or nine ocelli arranged in two or three series: — thus, 1+4, 3; 1+3, 3, 2; 1+4, 3, 1.

Prosternum 1.54 times wider than long. Distance between chitinous spots $2\frac{1}{3}$ times the width at level of bottom of median incision; 3.8–3.5 times the dental line. Median incision wide and shallow, sides strongly converging, rounded at bottom. Teeth moderately small, acute; line of bases forming a strongly reentrant angle and the line of apices accordingly recurved. Sides of anterior portion sloping immediately from the outer teeth, straight, slanting more strongly ectad than usual.

First dorsal plate widest near the middle, from where the sides are subparallel cephalad and rather strongly converging caudad. Caudal angles of eleventh and thirteenth dorsal plates a little produced in the typical manner; those of the ninth straight or a little oblique.

Coxal pores small and circular, the proximal ones in each series somewhat smaller than the distal; 2, 2, 2, 2 or 2, 3, 3, 2.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of the second, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of the third and fourth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the fifth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$ or $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the sixth to eleventh, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 0,\ 0,\ 1,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 0,\ 1,\ 1,\ 1}$; of the penult, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, claws 2; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, claws 2.

Anal legs of the male short; uniformly and but little thickened. Penult legs as usual; lobe or process extending dorsocaudo-distad, flattened in a distoectal and proximo-mesal direction, considerably

longer along line of attachment than its height above surface of joint, at distal end expanded over proximal portion, hairs at distal end of process as usual. (Plate 3, fig. 3–4).

Gonopods of male broad but very short, rounded; bearing two bristles.

Length of male type, 6.25 mm.; width of tenth plate, .78 mm.; length of antennae 1.75 mm.; of anal legs, 2 mm.

Locality.— Tennessee (Russellville!).

Nampabius longiceps, sp. nov.

Diagnosis.— Dorsal spines of anal and penult legs 0, 0, 2, 0, 0; ventral, 0, 1, 1, 1, 0. Dorsal spines of thirteenth legs, 0, 0, 2, 1, 0; ventral 0, 0, 1, 1, 1. Dorsal spines of twelfth legs 0, 0, 2, 1, 1 – 0, 0, 1, 1, 1. Dorsal spines of eleventh legs, 0, 0, 0, 0, 1; of tenth (as also of the second to ninth), 0, 0, 0, 1, 1. Ventral spines of ninth to twelfth pairs of legs (as also of the fourth or fifth to eighth), 0, 0, 0, 1, 1.

Ocelli 7 or 8 in two series.

Prosternum about 1.48 times wider than long. Distance between chitinous spots 2.15 times the width at median incision; 3.5 times the dental line.

Median lobe of claw of female gonopods but little longer than the lateral. Spines wide with the sides parallel from base to the very short, acuminate distal portion.

Body slender, being 8.5 times longer than the width of the tenth plate.

Head only slightly wider than long, less rotund than in *N. lulae*.

First dorsal plate 1.8+ times wider than long.

Dorsum testaceous with anterior and posterior plates darker. Head reddish or chestnut.

Description.— Dorsum testaceous, with the anterior and the posterior plates darker. Head reddish or chestnut. Antennae brown, pale at tips. Prosternum brown. Venter very pale, with the caudal plates darker and the anterior ones strongly suffused with violaceous. Legs pale like the venter, the posterior pairs darker brown.

Body comparatively slender being about 8.5 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36: 30: 33: 41: 41: 39.

Head only slightly wider than long (36: 35); less rotund than in *lulae*. Hairs moderate in length, few.

Antennae very short, reaching only the fourth or fifth segment. Articles short and very short, decreasing distad as usual. Hairs of moderate length, rather sparse proximally, becoming more dense distad.

Ocelli 7 or 8; arranged in two series:— thus, 1+3, 3; 1+4, 3.

Prosternum 1.48— times wider than long. Distance between chitinous spots 2.15 times the width at level of median incision; 3.5 times as great as the dental line. Teeth subequal, acute, with sides nearly straight but with interval on each side narrowly rounded at the bottom; line of apices recurved. Median incision well rounded at bottom as usual; but the sides more nearly straight and less converging. Sides of anterior portion but slightly convex, sloping ecto-caudad immediately from base of spine.

First dorsal plate widest near anterior end; the sides moderately converging caudad; 1.8 times wider than long. Thirteenth plate with caudal angles a little produced; but the eleventh and ninth with posterior margin straight all the way across or nearly so, or the eleventh showing a tendency for the angles to be weakly produced.

Coxal pores very small; 2, 3, 3, 3.

Spines of the first legs, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of the second, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of the third, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the fourth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$ or $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the fifth to tenth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the eleventh, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$ or $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 0,\ 1,\ 1,\ 1}$; of the penult and anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, with two claws.

Claw of the gonopods of female short, moderately curved, tripartite; lobes short and acute, the median being but little longer than the lateral. Basal spines wide with sides parallel from base to the acuminate distal portion which is relatively very short with its straight sides converging to an almost obtuse angle, its outer side being longer than its inner. Inner side of first article of gonopods a little convex distally and slightly concave proximally, subparallel with its fellow.

Length of type 6.5 mm.; of antenna, 1.9 mm.; of anal leg, 1.8 mm.; width of tenth dorsal plate, .76 mm.

Locality.— North Carolina (Asheville!).

Nampabius lulae, sp. nov.

Diagnosis.— Dorsal spines of anal and penult legs, 0, 0, 2, 0, 0; ventral, 0, 1, 1, 1, 0. Dorsal spines of thirteenth legs, 0, 0, 2, 1, 1; ventral, 0, 0, 0, 1, 1–0, 0, 1, 1, 1. Dorsal spines of twelfth legs,

0, 0, 2, 1, 1; of the eleventh, 0, 0, 0, 0, 1; of the tenth (as also of second to ninth), 0, 0, 0, 1, 1. Ventral spines of ninth to twelfth pairs of legs (as also of the sixth to eighth), 0, 0, 0, 1, 1.

Ocelli 7 to 11 in 2 or 3 series.

Prosternum 1.55+ times wider than long. Distance between chitinous spots 2.1 times the width at median incision; 3.5 times the dental line.

Body about seven times longer than the width of tenth plate.

Head subrotund; wider than long.

First dorsal plate 1.75 times wider than long.

Dorsum rather dark brown, in some of reddish caste. Head deep reddish brown or almost black.

DESCRIPTION.— Dorsum rather dark brown, which may be somewhat reddish in caste. Head deep reddish brown or almost black. Antennae dark brown proximally, pale at tips. Prosternum brown, the prehensorial feet considerably lighter in shade. Venter dilute greyish brown to light brown, the caudal plates darker brown as usual and the anterior segments commonly distinctly suffused with violaceous. Legs like corresponding portion of venter, the posterior pairs being thus darker, brown, paler distally.

Body seven times, a little more or less, longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 37: 31: 34: 42: 44: 42.

Head subrotund, wider than long in ratio 35.5: 33.5. Hairs moderately short, sparse.

Antennae short, only moderately attenuated. Articles short, decreasing distad as usual. Hairs of moderate length, not especially dense.

Eyes each composed of from 7 to 12 ocelli in two or three series:— thus, 1+4, 4, 2; 1+4, 4, 1; 1+3, 3; 1+4, 3. Single ocellus relatively large.

Prosternum 1.55+ times wider than long. Distance between chitinous spots 2.1 times width at level of bottom of median incision; 3.5 times the dental line. Teeth small and acute; line of apices clearly recurved; interval between teeth of each pair angular. Median incision relatively wide, semicircular, being widely curved at bottom and with sides considerably converging. Spine moderately stout at base, long and acutely, finely acuminate as usual; parallel with ectal edge of outer tooth. Lateral slopes beginning at spine and extending directly ectocaudad.

First dorsal plate 1.75 times wider than long; sides from middle to anterior end nearly straight and parallel; caudad of middle strongly

convexly rounding in mesad about the caudal corners. Ninth plate with its caudal margin straight or a little bent forwards at ends. The eleventh and thirteenth plates with posterior corners only slightly produced caudad.

Coxal pores small; on distal portion of coxa; in number 2, 2, 2, 2, mostly.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of second, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 0}$; of third to tenth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$, the dorsal spines on tenth legs being on anterior side of joint; of twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$, the dorsal spine of fourth article being posterior and that of fifth joint anterior in position; of thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1} - \frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$, the two single dorsal spines situated on posterior side; of penult and anal legs, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, each with two claws.

Anal and penult legs of male short and moderately, uniformly inflated; fourth joint longitudinally sulcate above, the third and fifth less distinctly so. Process of penult legs present in usual position.

Gonopods of male each extending somewhat ectocaudad, the mesal side being very long and convex and the ectal relatively very short, bearing two (or one) bristles.

Length from 5 to 6.5 mm. A male 6 mm. long has antenna 2 mm. long; anal leg 1.8 or 1.9 mm. long; and the tenth plate .87 mm. wide.

Type Locality.— Georgia (Lula).

Known Localities.— Georgia (Lula!); Tennessee (Johnson City! Russellville!).

Nampabius lundii (Meinert).

Lithobius lundii Meinert, Myriap. Mus. Haumensis, 1886, **3**, p. 12.

Description.— The original description, somewhat rearranged, is as follows:

Brunneus, capite cum antennis obscuriore, subtus pallidiore, pedibus flavis.

Sat gracilis, sublaevis.

Capite suborbiculare, fere aeque longo ac lato.

Antennae breviusculae, 19-articulatae, articulis longiusculis.

Oculi ocellis 6–7, in series 3 digestis.

Dentes prosternales bini.

Laminae dorsales omnes angulis rectis.

Pori coxales 2, 3, 3, 2, rotundi, parvi vel perparvi.

Pedes corporis primi paris calcaribus 0, 0, 1; pedes anales calcaribus 1, 1, 1, 0 armati, unguibus binis; pedes penultimi paris unguibus binis armati. Pedum analium coxae inermes.

Pedum penultimorum tibiae in angulo interno appendice parvo nodiformi instructae.

Pedes postici breviusculi, crassiusculi.

Long. (maris) 6.5 mm.

Locality.— Near New York City (L. Lund): the type is in the Museum at Copenhagen.

Garibius, gen. nov.

Body considerably narrowed from the tenth segment cephalad to the first, the dorsal plate of which is much narrower than the head a little narrower than that of the third segment. Moderate to slender, the length varying from 7.5 to 9.5 times the width of the tenth plate. Varying from 5 to 9.5 mm. in length.

Antennae short; uniformly composed of twenty articles.

Ocelli in three or, less commonly, in two series; 6 to 14 in number. Single ocellus typically not larger than the others.

Prosternal teeth 2+2; line of apices straight or but little recurved. Median incision v-shaped, strictly angular at bottom.

Posterior angles of none of the dorsal plates produced.

Claw of the female gonopods in all known species tripartite. Basal spines 2+2, slender. Mesal side of first article nearly straight.

Coxal pores small and circular; uniseriate; from 2, 3, 3, 2 to 3, 4, 4, 3.

Dorsal spines of the anal legs 1, 0, 2, 0, 0 or rarely 1, 0, 2, 1, 0; ventral, 0, 1, 3, 1, 0; claw 1. Dorsal spines of penult legs 1, 0, 2, 1, 0 or 1, 0, 2, 1, 1; ventral, 0, 1, 3, 2, 1; claws 3. Dorsal spines of thirteenth legs, 1, 0, 2, 1, 1; ventral, 0, 1, 3, 3, 2 to 0, 0, 2, 3, 2. Dorsal spines of twelfth legs, 1, 0, 2, 1, 1 or 0, 0, 0, 2, 2 to 1, 0, 2, 1, 2. Dorsal spines of eleventh legs 0, 0, 2, 1, 1 or 0, 0, 0, 2, 2 to 1, 0, 2, 1, 2; ventral, 0, 0, 0, 2, 1 to 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 to 0, 0, 2, 2, 1; ventral, 0, 0, 0, 2, 1 to 0, 0, 1, 2, 1. Last three or four pairs of coxae thus dorsally armed; while rarely none of the coxae are laterally armed, in most those of the last pair are, and those of the last two pair may be.

Anal legs of male moderately thickened; tibia always bearing at distal end on dorsomesal side a low crest bearing sensory setae

(Plate 4, fig. 6, 7, 9) much as in the genus *Nadabius* (*collium* Chamb., *iowensis* Mein., and allies). The tibia of the penult legs may or may not show a more weakly developed similar crest.

TYPE.— *G. monticolens*, sp. nov.

DISTRIBUTION.— Southeastern States and northward to Pennsylvania and New Jersey.

These forms seem particularly to prefer to live under the bark of fallen trees.

NOTE.— In my paper on the Lithobiomorpha of the Southeastern States (Ann. Ent. soc. America, 1911, 4, p. 32–50) several of the species now described were placed together under the name *Lithobius branneri* Bollman, the several forms being considered tentatively as varieties.

The following key is given as an aid in the identification of the species.

Key to species of Garibius.

a. Dorsal spines of anal legs 1, 0, 2, 1, 0. *G. catawbae*, sp. nov.

aa. Dorsal spines of anal legs 1, 0, 2, 0, 0.

b. First seven or more pairs of legs with the third joint ventrally unarmed.

c. Third joint of all legs dorsally armed; none of the coxae laterally armed; dorsal spines of penult legs 1, 0, 2, 1, 0; of the twelfth, 0, 0, 2, 1, 1 or 1, 0, 2, 1, 1. *G. georgiae*, sp. nov.

cc. Third joint of first ten or more pairs of legs dorsally unarmed; last pair of coxae laterally armed; dorsal spines of penult legs 1, 0, 2, 1, 1; of the twelfth 0, 0, 2, 2, 2. *G. alabamae*, sp. nov.

bb. All legs, or all excepting the first pair, with the third joint armed both dorsally and ventrally.

c. Last two pairs of coxae laterally armed.

d. Ventral spines of second to sixth legs 1, 3, 1; of 1st, 1, 2, 1, with the dorsal 2, 1, 1; head equal in length and breadth. *G. pagoketes*, sp. nov.

dd. Ventral spines of second to seventh legs 1, 2, 1; of first 0, 2, 1, with the dorsal 1, 1, 1; head distinctly wider than long. *G. mississippiensis*, sp. nov.

cc. Either none, or only the last pair, of coxae laterally armed.

d. None of the coxae laterally armed; dorsal spines of the eleventh legs 2, 1, 2, the ventral 1, 3, 2; ventral spines of the first legs 1, 3, 2. *G. dendrophilus*, sp. nov.

dd. Last pair of coxae laterally armed; dorsal spines of eleventh legs 2, 1, 1, ventral 2, 3, 2 or 3, 3, 2; ventral spines of first legs, 1, 2, 1 or 1, 3, 1.

e. Ventral spines of eleventh and twelfth legs 2, 3, 2; of second to sixth, 1, 3, 2. *G. opicolens*, sp. nov.

ee. Ventral spines of eleventh and twelfth legs 3, 3, 2; of second to sixth 1, 3, 1. *G. monticolens*, sp. nov.

Garibius catawbae, sp. nov.

Diagnosis.— Dorsal spines of anal and of penult legs, 1, 0, 2, 1, 0. Ventral spines of thirteenth legs, 1, 3, 3, 2 or 1, 2, 3, 2. Dorsal spines of twelfth legs, 0, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of eleventh legs, 0, 0, 2, 2, 2; ventral, 0, 0, 2, 3, 2. Dorsal spines of first legs, 0, 0, 2, 1, 1; ventral, 0, 0, 1, 2, 1. Third joint of all legs dorsally and also ventrally armed. Last pair of coxae laterally armed.

Antennae as usual.

Ocelli about 14 in three series.

Prosternum 1.65 times wider than long. Distance between chitinous spots 2.7 times the width at median incision; 3.78 times the dental line. Median incision strictly V-shaped.

Coxal pores 3, 4, 4, 3.

Body about 8.4 times longer than width of tenth plate.

Length (of type) 8 mm.

First dorsal plate 1.73 times wider than long.

Anal legs in the male with the usual crest. (Plate **4**, fig. 8–9). Penult legs with the tibia also bearing a sharp longitudinal ridge along dorsocaudal side the form of which at its distal end is somewhat suggestive of the crest of the anal leg.

Dorsum light chestnut; head scarcely darker.

Description.— Light chestnut above. Head scarcely darker. Antennae in color like the head, pale at tips.

Prosternum light brown, with the prehensorial feet paler. Venter pale, the caudal plates darker, burnt brown. Legs pale, with tarsi most pigmented; posterior pairs darker, brown or pale chestnut, lighter distally.

Body of usual form. Length about 8.4 times width of the tenth dorsal plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 45: 40: 42: 49: 50: 44.

Head of equal width and length or very nearly so. Nearly of uni-

form width between eyes and marginal breaks; narrowed rather more than usual cephalad.

Antennae short. Composed of the usual twenty articles which are short, articles more loosely united distally.

Eyes composed of about 14 ocelli arranged in three series:— thus, 1+5, 4, 4.

Prosternum 1.65 times wider than long. Distance between chitinous spots 2.7 times width at level of bottom of median incision; 3.78 times the length of dental line. Mesal incision strictly V-shaped, the sides being straight and meeting in an acute angle at bottom. Teeth acute, with their sides straight; the interval between each pair subacute at bottom or but narrowly rounded; inner tooth distinctly larger than the outer; line of apices straight or very nearly so. Lateral slope beginning at outer tooth; convex for entire length, most strongly so near its middle.

First dorsal plate with sides convex anteriorly; widest a little back of anterior end from where to the rounded caudal corners the sides are nearly straight and converge conspicuously; about 1.73 times wider than long. Posterior corners of ninth, eleventh, and thirteenth dorsal plates simply rounded.

Coxal pores small, regularly decreasing proximad on each coxa; in number, 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the second to sixth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$, of seventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 1}$; of eighth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of tenth and eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$, of thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$ or $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 2,\ 3,\ 2}$; of penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, claws 3; of the anal, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$; claw single. Coxae of anal legs laterally armed.

Anal legs of male moderately crassate, with the tarsi more or less abruptly more slender than the tibia, tibia at distal end with dorsomesal corner flattened and there bearing the typical low ridge or crest. Dorsomesal edge of crest forming almost a straight line, at distal end convex; bearing a number of moderately long hairs. (Plate 4, fig. 8–9). Joints longitudinally sulcate above and laterally. Penult legs with tibia bearing a sharp longitudinal ridge along dorsocaudal side, this at distal end in appearance suggestive of the crest of anal legs.

Length of type (♂) 8 mm.; length of antennae, 2.5 mm.; of anal legs also near 2.5 mm.; width of tenth plate, .95 mm.

Locality.— North Carolina (Catawba!).

Garibius monticolens, sp. nov.

Diagnosis.— Dorsal spines of anal legs 1, 0, 2, 0, 0. Dorsal spines of penult legs 1, 0, 2, 1, 0. Ventral spines of thirteenth legs, 0, 1, 3, 3, 2. Dorsal spines of twelfth legs, 1, 0, 2, 1, 1; ventral, 0, 0, 3, 3, 2. Dorsal spines of eleventh legs, 0, 0, 2, 1, 1; ventral, 0, 0, 3, 3, 2. Dorsal spines of first legs, 0, 0, 2, 2, 1; ventral, 0, 0, 1, 2, 1. All legs with third joint armed both dorsally and ventrally. Last pair of coxae laterally armed.

Antennae of usual form. (Plate 4, fig. 3).

Ocelli about 14 in three series. (Plate 4, fig. 4).

Prosternum 1.53 times wider than long. Distance between chitinous spots 2.38 or 2.4 times width at median incision; 3.58 times length of dental line. (Plate 4, fig. 1–2).

Anal leg of male moderately inflated; tarsi abruptly more slender; tibia bearing a crest in the usual position, this clothed with a subdense series of long hairs. (Plate 4, fig. 6–7). Penult legs without lobes.

Body slender; 9.5 times as long as width of tenth plate.

Head cordate; equal in length and width or nearly so.

First dorsal plate 2.5 to 2.6 times wider than long.

Dorsum light brown. Head dilute ferruginous brown or somewhat orange with frontal region paler.

Description.— Above, light brown. Head dilute ferruginous brown or somewhat orange, with the frontal region paler. Antennae light brown, paler distad as usual. Prosternum lighter than head. Venter pale testaceous; the caudal plates more deeply pigmented, more or less orange. Legs pale testaceous with the tarsi more pigmented, the posterior pairs darker, brownish.

Body slender, being nearly 9.5 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 54: 46: 47: 54: 56: 55.

Head cordate. Equal in length and width or very nearly so. Nearly constant in width between level of eyes and that of lateral breaks or a little caudad of then.

Antennae short. Composed of the usual twenty articles, these being loosely joined. (Plate 4, fig. 3).

Eyes consisting of about 14 ocelli arranged in three series:— thus, 1+5, 5, 3. Single ocellus oval. Ocelli of upper series, especially the more caudal ones, conspicuously larger than the other ones, the ocelli decreasing in size cephalad and ventrad. (Plate 4, fig. 4).

Prosternum 1.53 times wider than long. Distance between chitinous spots 2.38–2.4 times width at level of bottom of median incision; 3.58 times length of dental line. Mesal incision v-shaped, with sides nearly straight. Teeth acute, the mesal one larger than the ectal; line of apices straight or slightly recurved. Spine considerably stouter at base than the hairs, slender distally, of moderate length. Lateral slopes convex cephalad, concave and bending ectad caudally. (Plate **4**, fig. 1–2).

First dorsal plate widest a little caudad of the anterior end from where the sides are nearly straight and moderately converging to the rounded posterior corners; 2.5 to 2.6 times wider than long. Posterior angles of ninth, eleventh, and thirteenth dorsal plates simply rounded, with no tendency toward production.

Coxal pores small and circular; on each coxa decreasing regularly proximad.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of second to fifth, $\frac{0,\ 0\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$; of sixth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 1}$; of seventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of eighth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of ninth and tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the, eleventh, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, with three claws, of which the anterior is often very small, sometimes spine of coxa is doubled, making the dorsal formula thus 2, 0, 2, 1, 0; of the anal, $\frac{1,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, the claw single, long.

Anal legs of male moderate in length, moderately inflated distad to the tarsus which is abruptly more slender; tibia obliquely complanate at distal end on mesal side toward dorsal surface and there bearing a low subtriangular crest, the elevated end of which is caudad, its mesal, gently convex edge gradually resuming the level of the joint proximad, the crest bearing a subdense series of moderately long hairs which tend to be somewhat curved caudad at their distal ends (Plate **4**, fig. 6–7). Penult legs more slightly thickened, without special lobes. Third, fourth, and fifth joints of both anal and penult legs longitudinally sulcate dorsally.

Length of male type 9.5 mm.; width of tenth plate 1.07 mm.; length of antenna, 3.5 mm.; of anal leg also 3.5 mm.

Type Locality.— Tennessee (Unaka Springs!).

Localities.— Tennessee (Unaka Springs!); North Carolina (Asheville! Brown's Summit!).

Garibius opicolens, sp. nov.

Diagnosis.— Dorsal spines of anal legs 1, 0, 2, 0, 0; of penult 1, 0, 2, 1, 0. Ventral spines of thirteenth legs, 0, 1, 3, 3, 2. Dorsal spines of twelfth legs, 1, 0, 2, 1, 1, ventral, 0, 0, 2, 3, 2. Dorsal spines of eleventh legs, 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of first legs, 0, 0, 2, 2, 1; ventral, 0, 0, 1, 2, 1, or 0, 0, 1, 3, 1. Third joint of all legs armed both dorsally and ventrally. Last pair of coxae laterally armed.

Brown to light chestnut; head subferruginous, dusky caudad of suture.

Body moderate, being about 8.25 times longer than width of tenth plate.

Head broadly subcordate, nearly equal in length and breadth.

Eyes composed of from thirteen to fifteen ocelli in three series.

Prosternum 1.54 times wider than long, as in *G. monticolens*.

Penult legs without lobes; anal legs moderately inflated with the tarsi abruptly more slender, and the tibia bearing the usual crest which is nearly as in *monticolens*.

Gonopods of female with claw short and wide, tripartite, outermost lobe smallest; outer spine considerably longer than the inner on each side, sides of spines subparallel to the short and abruptly acuminate distal portion.

Description.— Dorsum brown to light chestnut, with nearly always a blackish median longitudinal stripe for all or most of length while two or more of the most anterior plates may be margined, caudally with blackish; fifteenth plate abruptly lighter, yellowish or light orange. Head subferruginous, dusky caudad of suture with a blackish median spot or stripe on caudal portion. Antennae dark proximally, orange or rufous distad. Prosternum orange or light ferruginous. Venter brown, the last plate orange like the corresponding dorsal one, with the immediately preceding one or two also often lighter. The posterior pairs of legs more densely pigmented as usual, the distal joints being light orange.

Body of moderate build, being about 8.23 to 8.26 times longer than width of tenth dorsal plate.

Head broadly subcordate. Equal in length and breadth or very slightly longer (49: 48). Widest just caudad of the marginal breaks from where the sides converge slightly cephalad to the eyes.

Antennae short. The twenty articles short, of uniform proportions,

moderately compactly joined, being less loose than in types of *monticolens;* ultimate article long and pointed. Hairs rather long, straight.

Eyes composed mostly of from thirteen to fifteen ocelli arranged in three series: — thus, 1+5, 4, 3; 1+5, 4, 4; 1+5, 5, 4. The single ocellus is typically broad and may be materially the largest; of the others those of the dorsal series are materially the largest, these decreasing in size cephalad.

Prosternum cir. 1.54 times wider than long. Distance between chitinous spots 2.4 times width at level of median incision; 3.78+ times the dental line. Outer tooth of each pair smaller than the inner one, both subacute; line of apices very slightly recurved. Interval between teeth of each pair semicircular. Sides of median incision straight, the bottom well rounded. Ectal spine materially stouter at base than neighboring bristles, rapidly acuminate to about middle of length, distad of where it is bristle-like; straight and moderately long.

Coxal pores circular and small; nearly uniform in size or the most proximal on coxa reduced. Common formulae are these: 3, 4, 4, 3; 4, 4, 4, 3; 4, 5, 4, 3; 4, 5, 4, 4; 4, 5, 5, 4.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$; of the second to sixth pairs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 2}$; of the seventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of the eighth to tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the eleventh and twelfth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, with three claws, of which the accessory ones are small but distinct; of the anal, $\frac{1,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, claw single, long. The median ventral spines of legs especially long. In one specimen the inner ventral spine of prefemur of both penult legs is bifid for about half of length. Coxae of anal legs laterally armed.

Anal legs of male of moderate length, considerably longer than the penult; moderately inflated, with the tibia a little clavately widening distad and the tarsal joints abruptly more slender; tibia at distal end with dorsomesal surface obliquely complanate and there bearing the usual crest, the free edge of which toward caudal end is convex and somewhat lowering distad but materially less so than the general surface of joint and sides of crest; crest bearing a series of hairs which are straight or with some of them a little bent caudad at ends, these hairs more slender than bristles of other parts of joint; the crest very similar to that of *monticolens*, see Plate **4**, fig. 6–7. Penult leg of male also moderately inflated, without any crest or special lobe. Prefemur, femur and, less distinctly, the tibia of anal and penult legs longitudinally dorsally sulcate.

The single article of the gonopods of male small but well exposed. Distally obliquely subtruncate. Bearing on distal surface mostly two long bristles.

Claw of female gonopods short and relatively wide; tripartite, the divisions acute and rather longer than usual, the middle lobe but slightly longer than the inner one, the outer one considerably shorter and more slender. Basal spines with outer one of each pair conspicuously longer than the inner; sides of spines subparallel or slightly diverging from base to the acuminate distal portion which is very short, occupying about one fourth of the total length, its sides strongly converging, its apex narrowly rounded; a denticle usually manifest on margin at beginning of acuminate portion on each side.

Length 8 to 11 mm. A specimen 10.5 mm. in length has antennae 2.6 mm. long and anal legs 3.5+ mm. long.

Immaturus.— Body pale yellow or dilute brown tinged with violaceous. Head yellow or pale orange. Anal legs whitish to yellow. Antennae pale yellow.

Antennae very short. Articles twenty, these distad of the fourth or fifth being very short, proportionately more so than in the adult, closely compacted. Hairs long, not dense.

Eyes composed of six to eight ocelli arranged in two series: — thus, 1+3, 2; 1+3, 3; 1+4, 3. Ocelli pale. Single ocellus somewhat largest; caudal two of dorsal row large, subequal the most anterior and those of the lower row reduced.

Prosternum practically as in the adult as regards the form and relations of teeth and ectal spines. Teeth pale.

Coxal pores small, with the most proximal one on each coxa only very slightly smaller than the distal one; 2, 2, 2, 2.

Spines of first legs, $\frac{0,\,0,\,0,\,1,\,1}{0,\,0,\,0,\,0,\,1}$, $\frac{0,\,0,\,0,\,0,\,1}{0,\,0,\,0,\,0,\,1}$ or $\frac{0,\,0,\,0,\,1,\,1}{0,\,0,\,0,\,1,\,1}$; of the second to fifth pair, $\frac{0,\,0,\,0,\,1,\,1}{0,\,0,\,0,\,1,\,1}$; or $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,0,\,1,\,1}$; of the sixth, $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,0,\,2,\,1}$ to $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,0,\,1,\,1}$; of the seventh, $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,0,\,1,\,1}$ to $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,0,\,2,\,1}$; of the eighth, $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,0,\,1,\,1}$ to $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,1,\,2,\,1}$; of the ninth, $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,0,\,2,\,1}$ to $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,1,\,2,\,1}$; of the tenth, $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,1,\,2,\,1}$; to $\frac{0,\,0,\,1,\,1,\,2}{0,\,0,\,1,\,2,\,1}$; of the twelfth, $\frac{0,\,0,\,1,\,1,\,0}{0,\,0,\,1,\,2,\,1}$ to $\frac{0,\,0,\,2,\,1,\,1}{0,\,0,\,1,\,2,\,1}$; of the thirteenth, $\frac{0,\,0,\,2,\,1,\,0}{0,\,0,\,1,\,2,\,1}$, $\frac{0,\,0,\,2,\,1,\,0}{0,\,0,\,2,\,2,\,1}$, $\frac{1,\,0,\,2,\,1,\,0}{0,\,1,\,2,\,2,\,1}$, or $\frac{1,\,0,\,2,\,1,\,1}{0,\,1,\,3,\,2,\,1}$; of the penult, $\frac{1,\,0,\,2,\,1,\,0}{0,\,1,\,3,\,2,\,1}$; of the anal, $\frac{1,\,0,\,2,\,0,\,0}{0,\,1,\,3,\,1,\,0}$. Anal coxae armed laterally as in the adult.

Claw of female gonopods very small and weak, consisting of a single pointed process or with the lateral divisions indicated as slender

spinous points at base of the median process. Either two or three articles present. Basal spines 1+1; slender and acutely acuminate from base distad.

Length 4.75 to 5.75 mm.

Agenitalis I.— Body very pale, suffused with violaceous. Head, prehensorial feet and prosternum light orange. Antennae dilute yellow. Legs almost without pigment excepting the caudal pairs which are yellow.

Antennae composed of seventeen articles. Distally submoniliform. Bristles long, subsparse.

Ocelli four in two series: — thus, 1+2, 1. The single ocellus smaller than the caudal one of the upper series; the two ocelli of upper series well separated.

Prosternal teeth and spines of nearly same form and relations as in the adult.

Coxal pores 1, 1, 1, 1.

Anal glands still evident.

Length cir. 4 mm.

Type Locality.— New Jersey (Masonville!).

Localities.— New Jersey (Masonville! Camden! Westfield!); Pennsylvania (Upsal! Philadelphia!).

In New Jersey this species is found occurring commonly under the bark of fallen trees in pine woods.

This form is evidently very close to *monticolens* with which the first inclination was to unite it; but the examination of a considerable number of specimens from the localities above listed showed no variation in a number of differences presented. The most definite and readily usable difference is in the spining of the eleventh and twelfth pairs of legs, the formula for the ventral surface of which in *monticolens* is 0, 0, 3, 3, 2 whereas in all specimens of *opicolens* examined it is uniformly 0, 0, 2, 3, 2. A larger number of the posterior coxae are dorsally armed, but this in other species is subject to considerably variation so that it may not prove of distinctive value in the present case. *Garibius opicolens* is more robust and also presents well marked differences in color and color-pattern from that shown by the individuals of *monticolens* thus far observed.

Garibius dendrophilus, sp. nov.

Diagnosis.— Dorsal spines of anal legs, 1, 0, 2, 0, 0; of the penult, 1, 0, 2, 1, 0. Ventral spines of the thirteenth legs, 0, 0, 3, 3, 2. Dorsal

spines of the twelfth legs, 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of the eleventh legs, 0, 0, 2, 1, 2; ventral, 0, 0, 1, 3, 2. Dorsal spines of the first legs, 0, 0, 2, 2, 1; ventral 0, 0, 1, 3, 2. None of the coxae laterally armed.

Ocelli mostly near twelve, in three series.

Prosternum cir. 1.46 times wider than long.

Penult legs of male without lobes and the crest of tibia of anal legs almost obsolete.

Head subcordate; wider than long.

Robust, in type not fully seven times longer than width of tenth plate.

Dorsum reddish brown, with caudal margins of plates darkened; head light ferruginous, darker along caudal portion.

Description.— Dorsum reddish brown, somewhat darker along caudal borders of plates; last two plates brighter, more reddish in color. Head light ferruginous, darker across caudal portion. Prosternum yellow ferruginous, the prehensors being yellow. Antennae yellow proximally and more or less violaceous brown elsewhere excepting at very tip which is again lighter. Venter light brown of violaceous tinge; the anterior plates somewhat darker, more reddish, and the posterior ones decidedly darker, subferruginous. Legs pale; the anal and penult pairs bright yellow excepting at bases.

Body considerably more robust than in *G. monticolens* and *opicolens*, in the type being not fully seven times as long as width of tenth dorsal plate.

Head subcordate. Widest at or a little in front of marginal breaks between which and the eyes the sides are convex; sides converging from breaks caudad about the well rounded corners to the caudal margin which is straight or slightly incurved. Anterior margin between eyes substraight, crenately indented a little each side of median line. Hairs of moderate length; sparse. Wider than long about in ratio 58: 55.

Antennae rather short; 2.75— times longer than the head. Composed of the usual twenty articles which decrease uniformly in diameter and length distad; rather loosely joined; ultimate article relatively shorter than in *monticolens* and *opicolens*. Hairs long and straight, of moderate denseness.

Eyes consisting mostly of about twelve ocelli arranged in three series: — thus, 1+5, 4, 2; 1+5, 3, 2. Single ocellus largest.

Prosternum cir. 1.46 times wider than long. Distance between chitinous spots nearly three times (in type 2.9—) as great as width at

level of bottom of median incision; 3.84 times the length of the dental line. Mesal incision v-shaped, subacute at bottom but with the converging sides a little concave. Line of bases of teeth distinctly recurved; but the inner tooth on each side larger than the outer so that the line of apices is nearly straight. Teeth acute, the interval between those of each pair angularly rounded at bottom. Ectal spine stouter at base than the bristles, rapidly acuminate, short.

Coxal pores moderately small; in type, 2, 3, 3, 2.

The single article of the gonopod of male broad but short and only slightly exposed. Broadly truncate. A moderately long median apical bristle and at least one more ectal in position.

Spines of first to eighth pairs of legs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 2}$; of ninth and tenth pairs, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of the eleventh, $\frac{0,\ 0,\ 2,\ 1,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$; of the anal, $\frac{1,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$, claw one. None of the coxae laterally armed.

Length cir. 7.5 mm. Length of antennae 2.7 mm.; of anal legs, 3+ mm.

Locality.— Pennsylvania (Philadelphia!).

One male thus far known. Like the preceding species, the type of this one was found under the bark of a fallen log.

This species appears to be related somewhat closely to the two preceding ones; but it is very readily distinguishable through lacking a lateral spine on the anal coxae; the ventral spines of the anal leg being 0, 1, 3, 2, 0 instead of the more usual 0, 1, 3, 1, 0; the absence of spine from trochanter of thirteenth legs; the dorsal spines of the eleventh legs being 0, 0, 2, 1, 2 instead of 0, 0, 2, 1, 1 or 1, 0, 2, 1, 1, and the ventral 0, 0, 1, 3, 2 instead of 0, 0, 2, 3, 2 or 0, 0, 3, 3, 2; the ventral spines of the first legs being 0, 0, 1, 3, 2 instead of 0, 0, 1, 2, 1 or 0, 0, 1, 3, 1; through the almost obsolete crest of tibia of anal legs; and finally through apparently greater robustness.

Garibius pagoketes, sp. nov.

Diagnosis.— Dorsal spines of anal legs 1, 0, 2, 0, 0. Dorsal spines of penult legs, 1, 0, 2, 1, 0. Ventral spines of thirteenth legs, 0, 1, 3, 2, 2. Dorsal spines of twelfth legs 0, 0, 2, 1, 1; ventral 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 0, 0, 2, 1, 2; ventral, 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 2, 1, 1; ventral, 0, 0, 1, 2, 1. All legs with the

third joint armed both dorsally and ventrally. Last two pairs of coxae laterally armed.

Antennae of usual structure and relations.

Ocelli 10 in two or three series.

Prosternum 1.65— times wider than long.

Length (type) 8 mm.

Body eight times longer than width of tenth plate.

Head equal in length and breadth.

First dorsal plate 1.65 times wider than long.

Dorsum brown, darker caudad. Head light in front of suture. Antennae rufous yellow distad.

Description.— Dorsum brown, the caudal plates becoming somewhat dilute chestnut. Head pale in front of the suture. Antennae brownish, distally lighter, yellow of somewhat rufous tinge. Legs brownish yellow, the anterior pairs lightest, caudal pair more yellow distally. Venter light brown, darker, more reddish, caudad. Prosternum testaceous.

Head subcordate; equal in length and breadth; of nearly uniform width between eyes and lateral breaks or a little widest at the latter; widely rounded from the breaks caudad about the corners.

Antennae short. Articles distad of the third short and very short, the distal ones proportionately somewhat longer than the more proximal.

Eyes in type consisting of ten ocelli arranged in two or three series: — thus, 1+5, 4 to 1+4, 3, 2. Single ocellus large.

Prosternum about 1.65— times wider than long. Distance between chitinous spots 3.75 times width at median incision, 4 times the dental lines.

First dorsal plate 1.65 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates obliquely excised.

Coxal pores small, circular, decreasing proximad; in number, 3, 3, 3, 3.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of second to sixth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$; of seventh to ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of eleventh, $\frac{0,\ 0,\ 2,\ 1,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 3,\ 2,\ 2}$; of the penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, claws 3; of the last, $\frac{1,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, claw single.

Claw of female gonopods proportionately wide, triparite, the divisions not differing much in length, acute. Inner spine of each pair markedly shorter than the outer (*maturus*). Spines not acuminate

from base, but somewhat constricted near middle of length and of greatest width immediately below the flattened acuminate opical portion, which is short.

In the type (♀) the widths of head, and first, third, eighth, tenth, and twelfth dorsal plates are as 50:46:48:56:57:56.

Length of type 8 mm.; width of tenth plate 1 mm.; length of antennae 2.4 mm.; of anal legs about 3 mm.

Type Locality.— Massachusetts (Blue Hills!).

The closest allies of this species would seem to be *G. monticolens, opicolens,* and *dendrophilus,* from which it is to be separated by the characters assigned in the key and the diagnosis. The male is not known.

Garibius mississippiensis, sp. nov.

Diagnosis.— Dorsal spines of anal legs 1, 0, 2, 0, 0. Dorsal spines of penult legs 1, 0, 2, 1, 0. Ventral spines of thirteenth legs 1, 3, 3, 2. Dorsal spines of twelfth legs 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 1, 0, 2, 1, 2; ventral, 0, 0, 2, 3, 2. Dorsal spines of first legs, 0, 0, 1, 1, 1; ventral, 0, 0, 0, 2, 1. All legs with the third joint dorsally armed, and all excepting the first with this joint also ventrally armed. Last two pairs of coxae laterally armed.

Ocelli about 12, in three series.

Antennae as usual.

Prosternum $1\frac{2}{3}$ times wider than long. Distance between chitinous spots 2.5 times width at median incision; $4\frac{1}{3}$ times the dental line. Incision strictly v-shaped.

Body 7.5 times longer than width of tenth plate.

Length (type), 6.75 mm.

Head cordate; clearly wider than long.

First dorsal plate 1.8+ times wider than long.

Fifth article of anal leg of male raised into an edge along dorsomesal side with the ridge at caudal end elevated into a crest bearing a number of hairs of the usual character. Penult legs without lobes.

Pale testaceous with the posterior plates orange. Head orange or light ferruginous.

Description.— Dorsum pale testaceous with the posterior plates orange. Head orange or light ferruginous. Antennae yellow. Prosternum orange of paler shade than head. Venter pale with caudal plates more or less orange. Legs pale excepting the posterior pairs which are bright orange.

Body more robust relatively than in related species; 7.5 times longer than width of tenth dorsal plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 43:37:38:46:47:46.

Head cordate. Widest a little back of eyes from where the sides gently converge caudad; rather strongly narrowed cephalad. Wider than long in about ratio 43:40. Hairs rather short, sparse.

Antennae short, reaching the sixth segment or nearly so. Composed of the usual twenty articles which decrease in size distad from the second, and, excepting those at the two ends, are very short. Hairs short and not very dense.

Eyes composed mostly of about 12 ocelli which are arranged in three series:— thus, 1+5, 4, 2; 1+4, 4, 3. Single ocellus small, not larger than others. Seriate ocelli not contiguous, the caudal ones not larger than the anterior; all small.

Prosternum $1\frac{2}{3}$ times wider than long. Distance between chitinous spots 2.5 times width at level of bottom of median incision; $4\frac{1}{3}$ times the dental line. Median incision strictly v-shaped, being angular at bottom with sides straight or but very slightly concave. Teeth small and acute; the inner slightly larger than the outer; line of apices weakly recurved or straight. Spine inserted a little ectad of outer tooth as usual; slender, straight.

First dorsal plate widest at or near anterior end, the sides at first gently and then more strongly converging caudad; 1.8+ times wider than long. Caudal corners of ninth, eleventh, and thirteenth dorsal plates straight or a little rounded, none of these either at all produced or excised.

Coxal pores very small: 2, 3, 3, 2 – 3, 3, 3, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the second to seventh inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the eighth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 2}$; of the ninth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the eleventh, $\frac{1,\ 0,\ 2,\ 1,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$, of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, with three claws; of the anal, $\frac{1,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, claw single. Last two pairs of coxae laterally armed.

Anal legs of male short and moderately inflated; fifth article narrowed to an edge along dorso-mesal line with at caudal end of this ridge a low, dorsally gently convex, crest bearing a number of hairs of the usual character; longitudinally sulcate laterally. Penult legs less inflated; without lobes.

Length of type 6.75 mm.; width of tenth plate, .9 mm.; length of antenna, 2.25 mm.; of anal leg, 2.5 mm.

Locality.— Mississippi (Brookhaven!).

Garibius georgiae, sp. nov.

Diagnosis.— Dorsal spines of anal legs, 1, 0, 2, 0, 0. Dorsal spines of penult legs, 1, 0, 2, 1, 0. Ventral spines of thirteenth legs, 0, 0, 2, 3, 2. Dorsal spines of twelfth legs, 0, 0, 2, 1, 1 – 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of eleventh legs, 0, 0, 2, 1, 1; ventral, 0, 0, 2, 2, 2. Dorsal spines of first legs, 0, 0, 1, 1, 1; ventral, 0, 0, 0, 2, 1. Third joint of all legs dorsally armed; but about first eight or nine pairs with this joint unarmed ventrally. None of the coxae laterally armed.

Antennae as usual.

Ocelli about 9 to 11 in three series.

Prosternum 1.9 times wider than long. Distance between chitinous spots 2.44 times width at median incision; 3.44 times the dental line.

Coxal pores 2, 3, 3, 2 – 2, 3, 3, 3.

Claw of gonopods of the female small; tripartite; lobes acute with the median considerably longest. Outer spine longer than the inner; moderately long and slender, attenuated from the base distad, the sides more strongly rounding in toward the apex.

Anal leg of male modified as usual, the fifth article bearing above a low ridge elevated into a low crest at caudal end.

Length 5.5 to 7.5 mm.

Body 9 times as long as width of tenth plate.

Head equal in length and breadth.

First dorsal plate 1.84 times wider than long.

Dorsum yellow, with caudal plates verging to light orange. Head light orange.

Description.— Yellow above, with the caudal plates tending toward light orange. Head light orange. Antennae yellow. Prosternum paler than head, being more of a lemon yellow. Venter very pale excepting the caudal plates which are like the prosternum. Legs pale, almost whitish, excepting the caudal pairs which are orange brown.

Rather slender, being nine times as long as the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 40: 35: 36: 42: 43: 40.

Head equal in length and breadth or in the male it may be a little longer. Widest a little caudad of eyes from where the sides moderately converge caudad; rather strongly narrowed cephalad. Hairs short and sparse.

Antennae short; moderately attenuated; composed of twenty articles, most of which are short and very short, the ultimate relatively long. Hairs of moderate length, not very dense.

Eyes each composed of from 9 to 11 ocelli arranged in three series:— thus, 1+4, 4, 2; 1+4, 3, 3; 1+4, 3, 1; 1+4, 3, 2. Single ocellus of same size as or a little smaller than those of the upper series, the seriate ocelli decreasing in size cephalad and ventrad. All ocelli pale.

Prosternum 1.9+ times wider than long. Distance between chitinous spots 2.44 times the width at level of bottom of median incision; 3.44+ times the length of the dental line. Median incision rather narrowly v-shaped, the sides straight. Teeth nearly equal or with inner on each side somewhat larger making the line of apices straight or nearly so; acute, with sides strictly straight and the interval between the two of each pair angular, not at all rounded. Spine fine, but slightly stouter than the hairs; straight; inserted a little ectad of base of outer tooth. Lateral edges of anterior portion gently convex cephalad and bending ectad caudally as usual.

First dorsal plate with sides almost parallel from caudal third cephalad; 1.84 times wider than long. Posterior corners of the ninth, eleventh, and thirteenth plates rounded or rather obliquely excised.

Coxal pores very small; 2, 3, 3, 2 – 2, 3, 3, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the second and third, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the fourth to sixth, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 2}$; of the eighth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 2}$; of the ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 2}$, or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$; of the tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1(0),\ 2,\ 2}$; of the eleventh, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 2,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$ or $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, claws 3; of the anal, $\frac{1,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, the claw single. None of the coxae laterally armed.

Anal legs of male short and moderately inflated; longitudinally sulcate laterally but not dorsally; fifth joint complanate above, extended in a low, rather sharply edged, longitudinal ridge along dorsomesal side which ends at caudal end in the usual crest, this being low with its free edge a little convex and bearing a series of hairs which are

curved at distal ends. Penult legs without any special modifications; moderately and uniformly inflated.

Claw of female gonopods small; considerably curved; tripartite; lobes acute with the median considerably longest. Outer of basal spines larger than the inner; moderately long and slender, a little attenuated from base distad, the sides toward end more strongly rounding in to the apex. Inner side of first article straight, a little diverging from its mate at anterior end.

Length of types from 5.5 to 7.5 mm. A specimen 7.3 mm. long has tenth plate .82 mm. wide, antennae 2.4 mm. long, and anal leg about 2.2 mm. long.

Locality.— Georgia (Atlanta!).

Garibius alabamae, sp. nov.

Diagnosis.— Dorsal spines of anal legs, 1, 0, 2, 0, 0. Dorsal spines of penult legs 1, 0, 2, 1, 1. Ventral spines of thirteenth legs, 0, 0, 2, 3, 2. Dorsal spines of twelfth legs, 0, 0, 2, 2, 2; ventral, 0, 0, 1, 2, 1. Dorsal spines of eleventh legs, 0, 0, 0, 2, 2; ventral, 0, 0, 0, 2, 1. Dorsal spines of first legs 0, 0, 0, 1, 1; ventral, 0, 0, 0, 1, 1. Third joint of first eleven pairs of legs or thereabouts unarmed either dorsally or ventrally. Last pair of coxae laterally armed.

Antennae as usual.

Ocelli about 6 in two series.

Prosternum 1.53 times wider than long. Distance between chitinous spots 2.4+ times width at median incision; 3.42 times dental line.

Crest of anal legs of male broader and more rounded than in related species; bearing numerous hairs of the usual type.

Length of type 5 mm.

Body 7.6+ times longer than the width of the tenth plate.

Head considerably longer than wide.

Dorsum anteriorly greyish yellow, becoming clearer yellow and light orange caudad. Head light orange.

Description.— Above the body is greyish yellow, becoming clearer yellow and light orange caudad. Head light orange. Antennae yellowish. Prosternum pale orange or yellow. Venter dilute yellow, deeper yellow caudad. Legs very pale excepting the caudal ones which are bright yellow.

Length about 7.6+ times the width of tenth dorsal plate. Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to

each other as 31 : 31+ : 31 : 34 : 34 : 33, the body being thus not strongly attenuated.

Head elongate, being considerably longer than wide (34 : 31). Hairs of moderate length, sparse.

Antennae short; moderately attenuated. Articles mostly very short, decreasing distad as usual; the ultimate moderately long. Hairs as usual in the genus.

Eyes composed of about 6 ocelli in two series: — thus, 1+3, 2. Single ocellus about equal in size to, or a little smaller than, the first one of the upper series. Seriate ocelli decreasing cephalad and ventrad; all pale.

Prosternum 1.53 times wider than long. Distance between chitinous spots 2.4+ times width at level of bottom of mesal incision; 3.42 times as great as the dental line. Teeth small and acute; interval between each pair rounded at bottom; inner tooth somewhat larger than the outer and the line of apices straight. Mesal incision rather wide and shallow, sides concave but meeting at an acute angle at bottom.

First dorsal plate widest a little back of the anterior end, the sides from there caudad at first slightly and then rather strongly converging. Posterior corners of ninth, eleventh, and thirteenth dorsal plates all straight on caudal side or a little rounded.

Spines of first legs, $\frac{0,\ 0.\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1\ (0),\ 1}$; of the second, $\frac{0,\ 0,\ 0,\ 1\ (2),\ 2}{0,\ 0,\ 0,\ 2\ (1),\ 1}$; of the third to eleventh inclusive, $\frac{0,\ 0,\ 0.\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the thirteenth, $\frac{1,\ (0),\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 2.\ 1,\ 1}{0,\ 1,\ 3,\ 2,\ 1}$, claws 2 (3); of the anal, $\frac{1,\ 0,\ 2,\ 0.\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, claw single. Last pair of coxae laterally armed.

Gonopods of male well exposed, convexly rounded, wart-like; bearing a single moderately long bristle.

Anal legs of male short, considerably inflated; fifth joint bearing at its distal end a low eminence which is relatively broader and more rounded than in related species, this lobe bearing over its surface rather numerous hairs of the usual character. Penult legs also inflated, but without any special lobes.

Length of type 5 mm.; width of tenth plate .65 mm.; length of antenna 1.6 mm.; anal leg of same length as antenna or nearly so.

Locality.— Alabama (Morgan!).

A single male was secured.

Garibius branneri (Bollman).

Lithobius branneri Bollman, Ann. N. Y. acad. sci., 1888, **4**, p. 107.

Description.— The original description, rearranged, is as follows:—

Light chestnut-brown or orange; head and antennae scarcely darker; feet orange.

Slender, smooth, very sparsely pilose.

Head rounded triangular, narrowest before.

Antennae short; joints 20, short.

Ocelli 6–8, arranged in four or five rows.

Prosternal teeth 4, small.

[Posterior angles of none of the dorsal plates produced].

Coxal pores 2, 3, 3, 2–3, 4, 4, 3, small and round.

First pair of feet armed with 0, 2, 1 spines; penultimate with 1, 3, 1, 1–1, 3, 2, 1; last with 1, 3, 1, 0.

In the male the fifth joint of the anal leg is produced into a short pilose lobe, and is depressed.

Claw of the female genitalia short, wide, bi- or tri-partite; spines slender, subequal, outer strongly toothed.

Length of body 5–10 mm.

Type Locality.— Tennessee (Knoxville!).

Localities.— Tennessee (Knoxville! Beaver Creek; Mossy Creek).

Tidabius, gen. nov.

Antennae short; composed of from 25 to 35 articles, but of mostly near 32.

Eyes composed mostly of from 9 to 14 ocelli which are arranged usually in three series; single ocellus largest.

Prosternum from 1.55 to 1.65 times wider than long, never less. Teeth 2+2; line of apices somewhat recurved. Spine bristle-like. Median incision v-shaped, being acute at bottom, or very rarely more or less rounded.

Body always considerably attenuated from the tenth plate cephalad with the first plate always and mostly considerably narrower than the third.

Posterior angles of none of the dorsal plates produced; or, often, with thirteenth or with eleventh and thirteenth showing a very weak production of these angles.

Coxal pores small and circular, uniseriate.

Gonopods of female tripartite with lobes short, the lateral ones equal and with their apices usually in nearly same transverse line. Basal spines 2+2 or, rarely, 3+3; proximal portion of spine relatively broad with sides parallel or diverging to where the acutely acuminate terminal portion begins more or less abruptly (Plate **4**, fig. 5).

Posterior coxae always wholly unarmed. Anal legs with the dorsal spines uniformly 0, 0, 2, 0, 0; ventral spines, 0, 1, 3, 1, 0 or, in some, 0, 1, 3, 2, 0; claws always 2 or 3. Penult legs with dorsal spines 0, 0, 3, 1, 0, or, rarely, 0, 0, 3, 1, 1; ventral spines, 0, 1, 3, 3, 1, to 0, 1, 2, 3, 1; claws 2 or 3. Third joint of first 7 to 9 pairs of legs mostly unarmed, rarely armed. Tibia of none of the legs with more than one ventral spine. All tarsi biarticulate.

Posterior legs in both sexes short and moderately inflated, longitudinally more or less sulcate dorsally; in male presenting no special modifications, or with legs but little more crassate.

Length between 5.5 and 10 mm.

TYPE.— *T. tivius* Chamberlin.

DISTRIBUTION.— The known species are distributed across the continent through the Northern United States from Washington and Oregon to the Atlantic and from there into the Southeastern States.

These small and wide-spread lithobiids never exceed 10 mm. in length. In most of the species the head varies from yellowish to ferruginous and is distinctly lighter than the dorsum. The venter commonly is suffused anteriorly with violaceous. The posterior legs are typically more brightly colored distad. These forms occur commonly under leaves and sticks of willows and other trees and shrubs along streams, under bark of logs, among stones at the water's edge and in other similar places. Where found they usually occur in considerable numbers. The species to one examining them at first commonly seem very close in general structure and appearance and are to be discriminated only upon careful study and comparison. The following key will aid in separating average individuals.

Key to species of Tidabius.

a. Ventral spines of anal legs 0, 1, 3, 2, 0 or 0, 1, 3, 3, 0.

b. Third article of all legs, or of all excepting the first two pairs, ventrally armed. *T. poaphilus*, sp. nov.

bb. Third article of at least the first five pairs of legs unarmed ventrally.

c. Dorsal spines of penult legs 0, 0, 3, 1, 1.
T. anderis, sp. nov.

cc. Dorsal spines of penult legs 0, 0, 3, 1, 0.

d. Anal leg with 3 distinct claws; basal spines of ♀ gonopods 3+3. *T. bonvillensis* Chamberlin.

dd. Anal leg with but 2 distinct claws; basal spines of ♀ gonopods 2+2.

e. Body 8 times, or but little more, as long as width of tenth plate. *T. suitus*, Chamberlin.

ee. Body 9 or more times as long as width of tenth plate.
T. nasintus, sp. nov.

aa. Ventral spines of anal legs 0, 1, 3, 1, 0.

b. Length of body of adults less than 8 mm.; mostly from 7.25 to 8.25 times longer than width of tenth plate.
T. tivius Chamberlin.

bb. Length of body of adults 8 mm. or more; 8.5 or more times longer than width of tenth plate.

c. Ventral spines of eleventh legs 0, 0, 1, 3, 1; of the thirteenth, 0, 1, 2, 3, 1 or 0, 0, 2, 3, 1.
Body 9 to 9.5 times longer than width 10th plate.
T. opiphilus, sp. nov.

cc. Ventral spines of eleventh legs 0, 0, 2, 3, 1; of the thirteenth, 0, 1, 3, 3, 1.

d. Dorsum brown; head brown of ferruginous caste; body about 8.5 times longer than width of 10th plate.
T. pallidus alabamensis, subsp. nov.

dd. Dorsum yellow; head light orange; body about 9 times longer than width of 10th plate. *T. pallidus*, sp. nov.

Tidabius nasintus, sp. nov.

Diagnosis.— Ventral spines of anal legs 0, 1, 3, 2, 0. Dorsal spines of penult legs, 0, 0, 3, 1, 0. Third joint of eleventh to fourteenth legs with three dorsal spines. Ventral spines of tenth and eleventh legs 0, 0, 1, 2, 1. Ventral spines of first legs, 0, 0, 0, 1, 1.

Articles of antennae (in type) 30.

Ocelli 11 in three series.

Distance between chitinous spots of prosternum 2.58 times width at median incision; 3.75–4 times the dental line.

Head slightly wider than long.

Coxal pores 2, 3, 3, 3.

Slender, about 9.3 times longer than the width of tenth plate.

First dorsal plate only $1\frac{2}{3}$ times wider than long.

Outer of basal spines on each side longer than the inner with which it stands at an angle; spines broad at base with sides slightly diverging to middle where acuminate portion begins.

Dorsum light brown, the caudal plates darker. Head darker brown or dilute chestnut with frontal region paler.

DESCRIPTION.— Above light brown with the caudal plates darker. Head darker brown or dilute chestnut, the frontal region paler. Antennae brown proximally, light at tips. Prosternum brown; prehensorial feet yellowish. Venter pale with the caudal plates darker, brownish. Legs like the corresponding plates of venter, the posterior pairs there being darker, brownish, but brighter distad as usual.

Body slender, being in the type 9.3 times longer than the width of the tenth plate. The widths of head and of the first, third, eighth, tenth, and twelfth plates to each other approximately as 41:35:38:43:45:43.

Head subcordate. Slightly wider than long (ratio about 41:40). Not much varying in width between caudal edge of eyes and the marginal breaks.

Antennae short. Composed of thirty articles which distad of the second or third become very short and closely arranged. Hairs short extending in part distoectad and in part proximoectad as usual.

Eye, in the type, composed of eleven ocelli arranged in three series:— thus, 1+4, 3, 3. Single ocellus largest. Ocelli of upper series larger and paler than others which decrease in size ventrad.

Prosternum, in type, 1.58— times wider than long. Distance between chitinous spots 2.58 times width at level of bottom of median incision; 3.87 times the dental line. Median incision rather small, v-shaped. Teeth small, acute, with sides nearly straight; inner tooth a little larger than the outer but the line of apices clearly recurved. Distance from tip to tip of mesal teeth about equal to or a little less than that from tip to tip of the two of each lateral pairs. Lateral margin of anterior portion convex anteriorly and concave posteriorly, where it bends ectad at end as usual.

First dorsal plate $1\frac{2}{3}$ times wider than long; widest a little back of the anterior end where the sides are convex, the sides then moderately converging caudad to the rounded corners. Caudal margin of the ninth plate straight or nearly so; angles of eleventh and thirteenth very slightly produced, the process rounded; posterior corners of other minor plates more or less obliquely excised.

Coxal pores circular; small, decreasing in size proximad on each coxa; 2, 3, 3, 3.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second, $\frac{0,\ 0,\ 1,\ 1(2),\ 1}{0,\ 0,0,\ 2,\ 1}$; of the third and fourth, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the fifth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh and eighth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2.}{0,\ 0,\ 1,\ 2,\ 1}$, of the tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 2,\ 2,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 2,\ 3,\ 1}$; of the fourteenth, $\frac{0,\ 0,\ 3,\ 1,\ 0.}{0,\ 1,\ 3,\ 3,\ 1}$, of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$, with two claws. None of the coxae at all armed.

Anal and penult legs of the female short, weakly inflated; especially the fourth joint longitudinally sulcate above.

Claw of female gonopods short and relatively wide; tripartite; the lobes short but distinct, the median longer than the lateral which are equal in size and at the same level. Outer of the two basal spines of each pair with which its wider surface stands at an angle as usual; spines broad at base with sides slightly diverging to the middle and then converging to a very acute apex, the sides of the acuminate portion being somewhat incurved. Inner side of first article of gonopods slightly curving ectad at proximal end and then a little diverging from its fellow.

Length of type 8 mm.; width of tenth plate, .86 mm.; length of antennae, 2.3 mm.; of anal leg, 2.1 mm.

Locality.— Mississippi (Jackson!).

Tidabius suitus (Chamberlin).

Lithobius cantabrigensis var. *suitus* Chamberlin, Ann. Ent. soc. America, 1911, **4**, p. 41.

Diagnosis.— Ventral spines of anal legs, 0, 1, 3, 2, 0. Dorsal spines of penult legs 0, 0, 3, 1, 0 or 0, 0, 2, 1, 0. Third joint of tenth to fourteenth legs inclusive armed with three dorsal spines. Ventral spines of tenth and eleventh legs, 0, 0, 1, 2, 1. Ventral spines of first legs, 0, 0, 0, 1, 1 or 0, 0, 0, 2, 1. None of the coxae armed.

Articles of antennae 29–32.

Ocelli 8–11 in 2 or 3 series.

Distance between chitinous spots of prosternum 2–2.25 times width at median incision; 3.75–4 times as great as the dental line. Median incision rather large, widely rounded at bottom.

Coxal pores 2, 3, 3, 2–3, 4, 4, 3.

Head subcordate, wider than long.

Body moderate; about eight times longer than the width of the tenth plate.

Median lobe of claw of female gonopods but little longer than the lateral. Basal spines very broad proximally, sides parallel or slightly diverging to about the middle where the acuminate portion begins.

Dorsum brown, with posterior segments darker and more reddish as are also sometimes the first ones. Head brown of dilute ferruginous tinge, especially anteriorly.

Description.— Brown above, with the posterior segments considerably darker and more reddish; some of the anterior plates may also be darker, especially along the caudal borders, these also often showing a violaceous tinge. Head brown of dilute ferruginous tinge, especially anteriorly. Antennae brown of purplish tinge, distally lighter, yellow or yellowish of dilute ferruginous tinge. Prosternum brown, the prehensorial feet lighter. Venter very pale, the anterior plates showing a distinct violaceous or purplish tinge and the caudal plate much deeper in color and more or less of reddish tinge. Legs like the corresponding plates of venter; the posterior pairs darker brown with the distal joints light.

Body moderate, being on an average 8+ times longer than wide. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 25.5: 22: 22: 26: 27: 26.

Head subcordate; wider than long in about ratio 25.5: 24. Hairs short, sparse. Form and markings as usual.

Antennae short, reaching the fifth segment composed of from 29 to 32, mostly very short, articles. Hairs moderate, straight, in part extending distoectad and in part almost directly transversely or somewhat caudoectad.

Eyes each composed mostly of about 8 or 9 to 11 ocelli in two or three series:— thus, 1+4, 4; 1+3, 3, 1; 1+4, 4, 2. Single ocellus considerably the largest. Seriate ocelli decreasing in size cephalad and ventrad.

Prosternum 1.58 times wider than long. Distance between chitinous spots 2 to 2.25 times greater than width at level of bottom of mesal incision; 3.75 to 4 times as great as the dental line. Teeth small; subacute; the interval between each pair concave; line of apices clearly recurved. Mesal incision rather large, sides but little converging caudad, the bottom being rather widely rounded. Spine slender and acuminate; inserted a little ectad of outer tooth and

extending somewhat mesad of directly cephalad. Lateral margin ectad of spine, convex, more caudad becoming concave and bending ectad.

Coxal pores small and circular; 2, 3, 3, 2 to 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$ or $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the second to fifth inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the sixth and seventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the eighth and ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the tenth and eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 1}$; of the penult, $\frac{0,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$ or $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$, claws 2 (or with obsolete third one); of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$, claws 2 (in regenerated legs may be but 1). None of the coxae at all armed.

Anal legs of male short and a little inflated; the third, fourth and fifth, but most distinctly the fourth, joints longitudinally sulcate on dorsal side. Penult legs similar but a little more slender.

Claw of the female gonopods short and relatively wide; tripartite; the median lobe but little longer than the two lateral, the distal margin of the latter almost at right angles to the longitudinal axis of claw. Basal spines very broad at base as usual, the sides parallel or a little diverging to about middle of length, then converging to an acute point. Inner side of first article nearly straight, being a little convex distally and slightly concave proximally, nearly parallel to that of its opposite gonopod.

Length 7–9 mm. A female 8 mm. long has the tenth plate .98 mm. wide; antenna 4 mm. long; and the anal leg 3.8–4 mm. long.

Praematurus.— Coloration similar to that of adult but paler throughout; light brown of a pale violaceous caste, with the fourteenth plate darker and the fifteenth lighter, the latter being yellowish as in the adult. Head light orange. Antennae brown, light at tips. Prosternum yellowish. Venter pale, the first plates more strongly tinged with violaceous, and the last one more strongly pigmented, yellowish or light orange. Legs pale, suffused with very dilute violaceous, the last pairs light yellow excepting proximally.

Antennae composed of twenty-five articles of which those beyond the third or fourth are very short and compactly arranged and those near the middle of length the shortest. Hairs straight, of moderate length, not dense.

Eyes composed of seven or eight ocelli arranged in two series:— thus, 1+4, 3; 1+4, 2. Ocelli small and pale, the single one largest and the most anterior ones smallest.

Prosternum is in adult or nearly so.

Coxal pores very small; 2, 3, 3, 3.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the second, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$ to $\frac{0,\ 0,\ 0,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the third to sixth, $\frac{0,\ 0,\ 0,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the eighth, $\frac{0,\ 0,\ 1,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the tenth and eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 2,\ 3,\ 1}$; of the penult, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$.

Claw of female gonopods short and relatively wide, with the three divisions acute and the outermost somewhat smallest. Spines 2+2; the outer one of each pair of nearly adult form, being broad or somewhat clavate proximally and acuminate from near the middle of length, the apex very narrowly rounded, the inner spine about half the size of the outer one, acuminate from very base.

Length cir. 5.25 mm. Length of antennae 2 mm.; of anal legs, cir. 2.2 mm.

(Haddonfield, N. J., Oct. 27, 1912).

Immaturus.— Still paler than the *prematurus;* of a violaceous tinge throughout; the last dorsal slate yellow. Head and prosternum yellow. Anal and penult legs with tibiae and tarsi yellow, the more proximal joints having the pale violaceous tinge of the rest of the legs.

Antennae very short. Composed of nineteen articles which distad of the third are very short. Hairs about as in the *prematurus.*

Eyes composed of about six ocelli arranged in two series: — thus, 1+3, 2. The most caudal ocellus of the dorsal series largest, the single one next, with the anterior one and those of the lower series much smaller.

Prosternum essentially as in older stages.

Coxal pores very small and pale; 2, 2, 2, 2.

Spines of first to third pairs of legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the fourth to sixth pairs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the seventh to ninth pairs, $\frac{0,\ 0,\ 0,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the tenth and eleventh pairs, $\frac{0,\ 0,\ 0,\ 2,\ 2}{0,\ 0,\ 0,\ 1,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 1,\ 2,\ 1}$; of the penult, $\frac{0,\ 0,\ 2,\ 1,\ 0}{0,\ 1,\ 2,\ 2,\ 1}$; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$.

Gonopods of female very short and pale; the three articles present, but the division between the second and third not yet very distinct. Claw indicated as a mere spinous point, the article beneath it distally

well rounded and bearing also a single bristle. Second article likewise bearing a single bristle. Proximal article bearing three bristles in a transverse row. Spines 1+1, small and pale; acutely acuminate from the very base.

Length cir. 4.2 mm.

(Haddonfield, N. J., Oct. 27, 1912).

Type Locality.— North Carolina (Hot Springs).

Localities.— North Carolina (Hot Springs!); Alabama (Birmingham!); New Jersey (Haddonfield!).

Tidabius poaphilus, sp. nov.

Diagnosis.— Ventral spines of anal legs 0, 1, 3, 2, 0. Dorsal spines of penult legs, 0, 0, 3, 1, 0. Third joint of tenth to fourteenth legs bearing 3 dorsal spines. Ventral spines of tenth and eleventh legs, 0, 0, 2, 3, 1. Ventral spines of the first legs, 0, 0, 1, 1, 1, or, occasionally, 0, 0, 0, 1, 1. None of the coxae armed.

Articles of antennae 32.

Ocelli 9–12 in three series.

Distance between chitinous spots about 2.25 times the width at median incision; 4 times the dental line.

Coxal pores 3, 4, 4, 3.

Head wider than long.

Body moderately robust, 7.5–7.75 times longer than the width of the tenth plate.

Claw of female gonopods as typical in the genus. Spines broad proximally, the sides of this portion parallel or a little diverging; acuminate portion more than half the total length.

Dorsum brown or greyish brown, suffused with dark purplish; the first and last several plates darker. Head brown to orange-brown, with the frontal region lightest.

Description.— Above brown or greyish brown, commonly suffused with dark purple; the first and the last several plates darkest. Head brown or orange-brown, the frontal region lightest. Antennae light brown, lighter at tips, often tinged with purplish. Prosternum and prehensors brown. Venter greyish or dilute greyish brown, the anterior plates typically tinged with purple and the caudal plates darker, brown. Legs like the corresponding plates of venter, the first commonly with a purplish tinge and the caudal pairs brownish proximally, brighter, yellowish, distally.

Body moderate or rather robust; the type 7.65 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 23:21:23:26:27:26.

Head wider than long in ratio 50:47.5. Caudal margin slightly and widely excurved. Sides between eyes and marginal interruptions very little excurved, subparallel. Hairs long, sparse.

Antennae of the usual length. Composed of 32 articles which beyond the second are very short and closely united, submoniliform. Hairs of moderate length and short; not very dense, sparser proximad; extending in various directions as usual.

Eyes each composed of 9–11 ocelli arranged in three, or occasionally, in but two, series:—*e. g.*, 1+4, 3, 3; 1+1, 4, 3; 1+5, 3. The lowest series almost on ventral side of head. Single ocellus largest. Of the seriate ocelli the first or most caudal of the uppermost series is largest, the first of the second series also large; others decreasing cephalad and ventrad as usual.

Prosternum 1.64 times wider than long. Distance between chitinous spots 2.25 times width at level of bottom of median incision; 4 times as great as the length of the dental line. Median incision moderately large, sides gently converging caudad; rather widely rounded at bottom. Teeth small, acute, equal; line of apices recurved. Tubercle of spine contiguous with base of outer tooth as usual; spine rather stout at base, running to a fine point with sides straight throughout length or nearly so, extending directly cephalad or nearly so, as in *T. anderis*. Lateral margins of anterior portions sloping directly caudoectad immediately from base of spine; the margins strongly incurved with caudal portion almost transverse. (Plate 5, fig. 3).

First dorsal plate with sides diverging cephalad to about the middle and then parallel or nearly so. 1.8+ times wider than long. Caudal angles of thirteenth plate a little produced as usual; angles of eleventh rectangular or showing a slight tendency to production; other minor plates with caudal margins bending a little forward at ends about the rounded corners. All plates finely but distinctly roughened with tubercular and rugose elevations.

Coxal pores small, circular; 3, 4, 4, 3; on each coxa decreasing in size proximad with the most proximal often very small.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$ or $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$, of the second, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the third to fifth inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the sixth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the seventh and eighth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$, or on

one side this and on the other, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$, or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$; of the tenth and eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 1}$; of the twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 2, 3, 1}$; of the thirteenth, $\frac{0, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; of the penult, $\frac{0, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claws 3; of the anal, $\frac{0, 0, 2, 0, 0}{0, 1, 3, 2, 0}$, claws 2. None of the coxae at all armed.

Posterior legs but little, uniformly inflated. Third, fourth, and fifth articles longitudinally furrowed on dorsal side as usual. Not differing in male and female.

Gonopods of the male small and rounded; bearing 1 or 2 bristles.

Claw of female gonopods short and but slightly curved; distinctly tripartite in the usual way; median lobe longest, obtusely rounded, less acuminate than in *anderis;* lateral lobes with distal margins nearly at right angles to axis of claw. Basal spines broad at base as in related species; the sides proximally parallel or a little diverging distad; acuminate portion long, more than half the total length. Mesal margin of first joint nearly straight, a little diverging from its fellow cephalad. Sternite mesally a little incurved as in related species and without a distinctly chitinized process.

The ♂ type is 7.5 mm. long; width of tenth dorsal plate .98 mm.; length of antenna 2.5 mm.; of anal leg, 3 mm.

Type Locality.— Nebraska (Fremont).

Localities.— Nebraska (Fremont! Omaha!).

Tidabius anderis, sp. nov.

Diagnosis.— Ventral spines of anal legs 0, 1, 3, 2, 0. Dorsal spines of penult legs, 0, 0, 3, 1, 1. Third joint of twelfth to fourteenth pairs of legs inclusive with three dorsal spines. Ventral spines of tenth and eleventh legs, 0, 0, 1, 2, 1. Ventral spines of first legs 0, 0, 0, 1, 1. None of the coxae armed.

Articles of antennae (in type) 31.

Ocelli 8 in two series.

Distance between chitinous spots 4 times the dental line; 2.46 times width at median incision.

Coxal pores 3, 4, 4, 3.

Claw of female gonopods as typical in the genus. Spines broad at base as in *T. tivius* but the acuminate apical portion embracing considerably more than half the total length.

Head longer than wide.

Body robust, being only about 7.4 times longer than width of tenth plate.

Dorsum testaceous, usually of dilute olivaceous or, sometimes, of somewhat purplish tinge; first and last plates darker as usual. Head yellowish orange to light ferruginous.

Description.— Above testaceous, in some of dilute olivaceous tinge, in others more or less purplish; the first plate and the most caudal ones often darker and some of the plates with their caudal borders crossed by a transverse dark stripe. Head yellowish orange to light ferruginous with a dark area on caudal portion along margin and extending forward along median line part way to the suture. Antennae brownish proximally, becoming yellow distad. Prosternum and prehensorial feet yellow to brown, the prosternum usually dusky over a yellow background. Venter pale, dilute testaceous or yellowish, the caudal plates darker brown. Legs like the contiguous plates of venter excepting that the posterior pairs beyond the proximal portion are bright yellow.

Body robust; in ♀ type, 7.4 times longer than width of tenth plate. Widths of head and of the first, third, eighth, tenth, and twelfth plates to each other as 25: 23: 24: 28: 26.5.

Head longer than wide in ratio 50: 47; a little more elongate than in *T. tivius* with the anterior portion somewhat narrower; not much varying in width between the marginal breaks and eyes; caudal margin straight.

Antennae short or very short. Composed of 31 articles which are very short, especially distad, and are closely aggregated. Bristles moderate in length, subdense on distal articles, becoming considerably sparser proximad.

Eyes in type each composed of about 8 ocelli arranged in two series:— thus, 1+4, 3. Ocelli large and distinct; single ocellus somewhat obliquely elliptic.

Prosternum 1.64 times wider than long. Distance between chitinous spots 2.46 times width at level of bottom of median incision; 4 times as great as length of the dental line. Teeth small and acute, pale; line of apices recurved. Tubercle of spine contiguous with base of outer tooth; spine manifestly stouter than the hairs, acutely acuminate as usual, extending almost directly cephalad and thus not parallel with outer edge of tooth as is more typically the case in *tivius*. Median incision rather narrow, the sides nearly parallel, but little converging caudad excepting toward bottom, the latter somewhat rounded.

First plate moderately narrowed caudad as usual, 1.9 times wider than long. Minor plates as in *tivius* or nearly so; in the anterior ones the caudal margin moderately bending forward to corners at ends; in the eleventh the posterior corners are nearly rectangular; in the thirteenth they are a little extended caudad. Plates all distinctly finely roughened.

Coxal pores small, circular, the most proximal one on some coxae minute; 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second to sixth inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh to ninth inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the tenth and eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the twelfth and thirteenth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the penult, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 1}$; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$, claws 2. No spines detected on any coxae.

Anal and penult legs in both sexes short; a little thickened.

Claw of female gonopods short; but little curved; median lobe longest, distally more or less narrowly rounded; lateral teeth with their distal edges in line and at right angles to the axis of the claw or nearly so. Spines broad at base as in *tivius*, but the acuminate portion longer, embracing considerably more than half the total length, apically acutely rounded with edge often showing a few minute denticulations. Ventral edge of mesal side of first joint well chitinized; nearly straight excepting proximally where it bends a little ectad.

The female type is 7.4 mm. long; width of tenth plate 1 mm.; length of antenna 2.25 mm.

Locality.— Washington (Pullman! W. M. Mann, 1908).

Tidabius pallidus, sp. nov.

Diagnosis.— Ventral spines of anal legs 0, 1, 3, 1, 0. Dorsal spines of penult legs 0, 0, 3, 1, 0. Third joint of tenth to fourteenth legs with three dorsal spines. Ventral spines of tenth and eleventh legs, 0, 0, 2, 3, 1. Ventral spines of first legs, 0, 0, 0, 1, 1. None of the coxae armed.

Articles of antennae, in type, 27.

Ocelli 9 or 10 in three series.

Distance between chitinous spots of prosternum 3.5 times the dental line; only 2.1 times width at median incision.

Head cordate, very little wider than long.

Coxal pores 3, 4, 4, 3.

Body moderately slender, about nine times longer than the width of the tenth plate.

Spines of ♀ gonopods large and broad, the sides parallel to near middle from where the acutely acuminate portion begins.

Dorsum yellow. Head light orange.

Description.— Yellow above with the caudal plates light orange. Head light orange. Antennae pale. Prosternum yellow of pale orange tinge. Venter very pale with caudal plates orange. Legs pale, the posterior pairs more densely pigmented, brighter in color.

Body slender, being 9 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 45: 40: 43: 51: 52: 48.

Head cordate; slightly wider than long (ratio about 45.5: 44). Hair short, sparse.

Antennae short and moderately attenuated as usual. In type composed of 27 articles which beyond the second are very short, shorter ones occurring in pairs at intervals among somewhat longer ones. Hairs as usual.

Eyes in type each composed of 9 or 10 ocelli arranged in three series: — thus, 1+4, 3, 1; 1+4, 3, 2. Single ocellus largest; first ocellus of top row also large and the others of this series also larger than the lower ones which decrease in size ventrad.

Prosternum 1.58 times wider than long. Distance between chitinous spots 2.1 times the width at level of bottom of median incision; 3.5 times the dental line. Median incision wide; sides distally concave, meeting at bottom in a wide angle; distance from tip to tip of mesal teeth clearly greater than between tips of teeth of each pair. Teeth small and acute; line of apices slightly recurved. Anterior lateral margin at first strictly transverse ectad of each outer tooth for a short distance, this portion bearing the spine, the caudally sloping portion at first conspicuously convex, becoming caudally concave and at caudal end bending directly ectad. Spine conspicuously stout at base, slender and fine pointed distally.

First dorsal plate 1.78 times wider than long, shaped as in *T. nasintus*. Caudal corners of thirteenth plate a little produced as usual; those of the eleventh caudally straight or somewhat excised; those of the ninth mostly a little excised or with caudal edge bent forward.

Coxal pores of the usual size and form; 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second to seventh inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 1}$; of the tenth and eleventh,

$\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 1}$; of the twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 2, 3, 1}$; of the thirteenth, $\frac{0, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; of the penult, $\frac{0, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claws 2; of the anal, $\frac{0, 0, 2, 0, 0}{0, 1, 3, 1, 0}$, claws 2. None of the coxae armed.

Posterior legs as usual.

Claw of female gonopods relatively short and wide as usual; lobes short but distinct, the median longest, the two lateral subequal and at same level with their caudal edges almost transverse. Spines large, broad, with sides from base to about middle parallel, spines distad from middle acutely acuminate. Inner side of first article diverging moderately from its fellow proximally.

The female type is 8.7 mm. long; width of tenth plate .97 mm.; length of antenna 3 mm.; of anal leg, 2.7 mm.

Locality.— Mississippi (Jackson!).

Tidabius pallidus alabamensis, subsp. nov.

Diagnosis.— Light brown, with the first and last plates darker. Head brown of dilute ferruginous tinge.

Somewhat more robust than type of *T. pallidus,* being but 8.5 times longer than width of the tenth plate.

Spining of legs as in *pallidus* or essentially so.

Coxal pores 3, 4, 4, 4.

Head as in *pallidus.*

Gonopods and spines nearly as in *pallidus.*

Distance between chitinous spots 3.1 times the dental line.

Description.— Dorsum light brown, the first two or three plates and, more especially, those of the caudal third distinctly darker. Head brown of pale ferruginous tinge. Antennae brown proximally, pale distally. Prosternum and prehensorial feet brown. Venter pale, the anterior plates suffused with violaceous, the posterior plates darker, brownish. Legs like adjoining plates of venter; the posterior pairs brown proximally and bright yellow or yellow of dilute orange tinge distally.

Body 8.5 times longer than width of the tenth plate. Widths of head and of the first, third, eighth, tenth, and twelfth plates to each other as 42:40:42:47:50:48.

Head a little wider than long (near 42:41); widest immediately back of eyes, with the sides conspicuously converging from the breaks caudad.

Antennae in type broken off at tips so precise number of articles is not determinable.

Eyes each composed of 12 ocelli in three series:— thus, 1+4, 4, 3; ocelli of the usual relative sizes and arrangement.

Prosternum 1.55+ times wider than long. Distance between chitinous spots about 2 times width at level of bottom of median incision; 3.1 times the dental line. Median incision wide, well rounded at bottom; distance from tip to tip of mesal teeth clearly greater than distance between tips of tenth of each pair. Teeth small and acute; line of apices almost straight, being only very slightly recurved. Sides of anterior portion convex anteriorly and bending ectad caudally as usual. Spine of usual form.

First dorsal plate of the usual shape, slightly shorter relatively than in type of *pallidus*. Thirteenth plate with posterior angles weakly produced; other minor plates with caudal corners more or less obliquely excised.

Coxal pores of usual size and shape; 3, 4, 4, 4.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 0, 1, 1}$; of the second to fifth, $\frac{0, 0, 2, 2, 1}{0, 0, 0, 2, 1}$; of the sixth to eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 1}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 1, 2, 1}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 1}$; of the twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 2, 3, 1}$; of the thirteenth, $\frac{0, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; of the penult, $\frac{0, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claws 2; of the anal, $\frac{0, 0, 2, 0, 0}{0, 1, 3, 1, 0}$, claws 2, long. None of the coxae armed.

Claw of female gonopods short and relatively wide; lobes short, with the median only a little longest, the two lateral equal and at the same level. Spines broad proximally, the sides diverging from base to a little below middle, the spine then acutely long acuminate. Inner side of first article subparallel with that of its mate excepting proximally, where it moderately diverges from it.

Length of female type 8 mm.; width of tenth plate .94— mm.

Locality.— Alabama (Selma!).

While manifestly very close to *pallidus*, the type of *alabamensis* is strikingly different in color, being much more in appearance like *nasintus*. Otherwise it differs a little also in robustness, being a little stouter. The prosterna are very similar. As only the type of each form has been examined, the precise relationship of the two cannot at present be definitely determined; but it seems best to keep them apart tentatively and to range one as subspecies to the other.

Tidabius tivius (Chamberlin).

Lithobius tivius Chamberlin, Ann. Ent. soc. America, 1909, **2**, p. 188.

Diagnosis.— Ventral spines of anal legs 0, 1, 3, 1, 0. Dorsal spines of penult legs, 0, 0, 3, 1, 0. Third joint of tenth to fourteenth legs armed dorsally with three spines. Ventral spines of eleventh legs, 0, 0, 2, 2, 1; ventral spines of first legs, 0, 0, 0, 0, 1. None of the coxae armed.

Articles of antennae 25 to 31.

Ocelli mostly 9 to 12 in three series.

Distance between chitinous spots 3.8 to 4.25 times the dental line; 2.3 times width at median incision.

Head equal in length and breadth or very nearly so.

Body robust, from 7.25 to 8.25, or thereabouts, times longer than the width of the tenth plate.

Coxal pores 2, 3, 4, 3–3, 4, 4, 3.

Claw of gonopods as usual. Spines broad with sides diverging to about the middle where the acuminate distal portion begins. (Plate **4**, fig. 5).

Dorsum pale brown or of pearl-grey caste, with the caudal plates more or less of a ferruginous tinge. Head light ferruginous.

Description.— Above pale brown faintly suffused with violaceous or sometimes of pearl-grey caste; the caudal plates somewhat ferruginous. Head light ferruginous, commonly darkened over median region of caudal portion. Antennae brown to somewhat ferruginous proximally, lighter distad. Prosternum paler than head, the prehensorial feet lighter. Venter very pale, suffused with violaceous; the caudal plates darker, more or less of ferruginous tinge. Legs also pale, the caudal pairs darker, brown, proximally, and brighter, yellowish, distad.

Body robust, being about 7.25 to 8.25 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 40: 34: 37: 40: 43: 42.

Head subcordate; equal in length and breadth or very nearly so. Hairs moderately long with shorter ones intermixed, sparse.

Antennae short and moderately attenuated. Composed of 25 to 31 articles which distad of the second are very short. Bristles almost transverse not especially dense. (Plate **5**, fig. 6).

Eyes each consisting of 10 or 11 ocelli in the types: — *e. g.*, 1+4, 4, 2; 1+4, 3, 2. Single ocellus largest; others regular in form and arrangement. (Plate **5**, fig 7).

Prosternum 1.58 times wider than long. Distance between chitinous spots 2.3 times width at level of bottom of median incision; 3.8 to 4.25 times the dental line. Median incision v-shaped, with sides rather strongly converging. Teeth small and acute; interval between the two on each side semicircular; line of apices clearly recurved. Anterior lateral margins rather strongly convex anteriorly, concave caudally. (Plate 5, fig. 2–3).

First dorsal plate 1.8 times wider than long; widest a little behind the anterior end where the sides are convex; sides then nearly straight and moderately converging to the rounded caudal corners. Posterior angles of the elventh and thirteenth plates a little extended caudad, rounded, those of ninth straight or obliquely excised.

Coxal pores small and circular as usual; 2, 3, 4, 3 – 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$ or $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the third to fifth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the sixth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh to ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the tenth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 1}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 2,\ 3,\ 1}$ to $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 1}$; of the penult, $\frac{0,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, claws 2. None of the coxae armed.

Anal and penult legs (♀) short; uniformly a little inflated. (Plate 5, fig. 4–5).

Claw of gonopods of female moderate; relatively wide; but weakly curved; the median lobe longest and the lateral ones equal and at the same level as usual. Basal spines broad proximally; sides diverging a little from base to about middle where the acutely acuminate distal portion begins, the sides of the latter straight. Mesal side of first article moderately diverging in proximal half from its fellow. (Plate 4, fig. 5).

Length 5.5–7 mm. A specimen 5.8 mm. in length has tenth plate .8+ mm. wide; and antenna 2 mm. long.

Pseudomaturus.— Freshly matured individuals seem to agree in nearly all features with the older ones; but the sixth legs more frequently bear but a single dorsal tibial spine instead of two and the eleventh legs more frequently bear a single ventral spine on the prefemur instead of two. Thus the spining, as might be expected, more frequently remains in the condition prevalent in the *praematurus* stage.

Praematurus.— Dilute brown, suffused more or less with violaceous, this being evident more especially on the anterior and posterior seg-

ments both above and below. Head light ferruginous. Posterior legs as usual more pigmented than the others.

Antennae composed of twenty-six or twenty-seven articles of nearly adult proportions.

Ocelli six, in two series: — thus, 1+3, 2. The single ocellus and the first of the upper row of the same size or nearly so and much larger than the others, the most anterior smallest.

Prosternum as in the adult.

Coxal pores small and pale; 2, 3, 3, 2.

Spines of the first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the second pair, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$ or $\frac{0,\ 0,\ 0,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the third to sixth, $\frac{0,\ 0,\ 0,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the seventh, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the eighth and ninth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the tenth and eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the penult, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 1}$; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$.

Claw of the female gonopods small and pale, the three lobes distinct but appearing more slender and acute than in the adult. Proximal article with about six bristles on its ventral surface. Spines 2+2; the inner one of each pair shorter and much more slender than the outer and acutely acuminate from the very base; in the outer spine also the demarcation between basal and acuminate portions less distinct than in the adult.

(Canton, Miss.).

Agenitalis I.— Very dilute yellowish, with the head as usual more densely pigmented. Antennae and legs pale; the last pairs of legs with more pigment, very pale yellowish.

Antennae composed of from twenty to twenty-three articles. Submoniliform. The last article conspicuously long. Hairs straight; of moderate length; not dense.

Ocelli four in one or two series: — thus, 1+3, or 1+2, 1. Small and pale.

Teeth of prosternum pale, their form and relations, as those of the ectal spines, as in the adult or nearly so.

Coxal pores small and weak edged; 1, 1, 1, 1 or 1, 2, 2, 1, the more proximal one when two are present on a coxa being considerably smallest.

Anal glands still evident but not very distinct.

Spines of first and second pairs of legs, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the third to ninth, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the tenth to thirteenth, $\frac{0,\ 0,\ 0,\ 0\ \ 0}{0,\ 0,\ 0,\ 1,\ 1}$; of the penult, $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 1,\ 1,\ 1}$; of the anal, $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 1,\ 1,\ 0}$.

(Sterling, Ill., July).

Type Locality.— Utah (Provo!).

Localities.— Utah (Provo! Salt Lake City!); Colorado (Colorado Springs! Ft. Collins!); Illinois (Sterling! Dwight! Peoria!); Kentucky (Lexington!); Tennessee (Johnson City!); Virginia (variety, Lynchburg! Balcony Falls!); New Jersey (Haddonfield!); Pennsylvania (Philadelphia! Ardmore!); Wisconsin (Janesville!); Massachusetts (Hough's Neck!); Alabama (Birmingham!); Mississippi (Brookhaven! Canton!).

Tidabius opiphilus, sp. nov.

Diagnosis.— Ventral spines of anal legs 0, 1, 3, 1, 0. Dorsal spines of penult legs 0, 0, 3, 1, 0. Third joint of tenth to fourteenth pairs of legs with three dorsal spines. Ventral spines of eleventh legs, 0, 0, 1, 3, 1. Ventral spines of first legs, 0, 0, 0, 1, 1.

Articles of antennae 27 to 32.

Ocelli 9 to 12 in three or, rarely, in four longitudinal series.

Head subcordate; wider than long.

Distance between chitinous spots 3.7 times as great as the dental line; 2.3 times the width at median incision.

Body 9 to 9.5 times longer than the width of the tenth plate.

Claw of the female gonopods much as usual. Basal spines broad proximally with sides subparallel; acuminate portion about two thirds the total length. (Plate **5**, fig. 9).

Brown; first and last plates darker. Head dark brown of a dilute ferruginous tinge.

Description.— Dorsum brown; first and caudal plates darker; the median region pale. Head darker, brown of a dilute ferruginous tinge, lightest in front of suture. Antennae brown proximally, lighter, yellowish or pale ferruginous, distally. Prosternum brown, the prehensorial feet paler. Venter very pale, tinged with violaceous anteriorly and the caudal plates darker, burnt brown. Legs pale like the venter; the caudal pairs darker, brown, commonly brighter distally.

Slender, moderately attenuated cephalad; 9 to 9.5 times longer than width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 48: 44: 45: 51: 52: 49.

Head subcordate, being considerably narrowed cephalad; wider than long in about ratio 49: 47. Hairs of moderate length, sparse.

Antennae short. Composed of from 27 to 32 articles which are short and very short. Hairs rather short, subdense.

Eyes each composed of from 9 to 12 ocelli in three or four series:— *e. g.*, 1+4, 3, 2; 1+4, 3, 3; 1+4, 3, 3, 1.

Prosternum 1.56 times wider than long. Distance between chitinous spots 2.31 times width at level of bottom of median incision; 3.7 times the dental line. Median incision v-shaped; sides subparallel distad, concave and converging caudad. Teeth small and acute, the interval between the two of each pair well rounded at bottom, not at all angular. Spine a little ectad of tooth, straight and slender; extending directly cephalad. Anterior lateral margins convex distad then becoming concave and bending out almost directly ectad caudally.

First dorsal plate widest a little back of anterior end where the sides are rounded, becoming there nearly straight and gently converging to the rounded caudal corners; 1.9 times wider than long. Posterior angles of eleventh and thirteenth plates very weakly produced caudad; those of the ninth straight to more or less obliquely excised.

Coxal pores 3, 4, 4, 3–3, 3, 3, 3; often decreasing markedly in size proximal on each coxa, the most proximal then being minute.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second to fifth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 0,\ 2,\ 1}$; of the sixth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the eighth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$; of the ninth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 0,\ 2,\ 1}$ or, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$ (noted on one side only, the other leg having the first formula); of the tenth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 1}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the thirteenth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$ or, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 2,\ 3,\ 1}$; of the penult, $\frac{0,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$, claws 2; of the anal, $\frac{0,\ 0,\ 2,\ 0,\ 0}{0,\ 1,\ 3,\ 1,\ 0}$, claws 2. None of the coxae armed.

Anal legs short; uniformly but only a little thickened; longitudinally sulcate above, especially the fifth article. Penult legs similar, but a little more slender.

Claw of female gonopods very short; bent; median lobe longest and the lateral subequal as usual. Sides rather broad with sides of proximal division subparallel; acuminate portion rather long, being mostly about two thirds of the total length, the apex acute or narrowly acutely rounded. (Plate **5**, fig. 9). Mesal side of first article more or less convex, diverging from its fellow proximately.

Length from 8 to 10 mm. A female 9 mm. long has tenth plate 1 mm. wide; antenna 2.8–3 mm. long; anal leg 3 mm. long.

Locality.— Wisconsin (Beloit!).

TIDABIUS BONVILLENSIS (Chamberlin).

Lithobius bonvillensis Chamberlin, Ann. Ent. soc. America, 1909, **2**, p. 189.

DESCRIPTION.— The original description of the types is as follows: —

Dorsum from light to blackish brown, the posterior border of most of the major plates usually lighter; head paler, brown or light brown, sometimes with a darker median area caudad of the frontal suture; antennae brown to blackish, yellowish or rufous distally; praesternum and feet concolorous with head; venter light brown to yellowish, the first and the last plates darkest; legs yellowish, the last few pairs commonly darker.

Head a little wider than long (3: 2.9).

Antennae short; the first two articles long, others short, closely crowded; articles 29 in number.

Eyes each composed of 8–9 ocelli arranged in two series (1+4, 3; 1+5, 3); ocelli of moderate size.

Prosternal teeth small, slightly darkened.

Angles of none of the dorsal plates produced.

Coxal pores small, round, the distal ones of each series largest as usual; 3, 4, 4, 4.

Ventral spines of anal legs 0, 1, 3, 2, 0, claws 3. Ventral spines of penult legs, 0, 1, 3, 3, 1, claws 3. Ventral spines of first legs 0, 0, 0, 0, 1. None of the coxae at all armed.

Gonopods of female with the claw tripartite as usual, the lobes short and rather blunt. Basal spines 3+3; decreasing in size from the most ectal to the most mesal on each side; each spine acuminate distad of middle as usual.

LOCALITY.— Utah (Lake Point!).

This species was found in May under stones along the foot-hills.

SIGIBIUS, gen. nov.

Dorsal spines of anal legs 0, 0, 1, 0, 0; ventral, 0, 1, 1, 1, 0; claws 2. Dorsal spines of penult legs, 0, 0, 1, 0, 0; ventral, 0, 1, 1, 1, 0, claws 2. Dorsal spines of thirteenth legs, 0, 0, 1, 0, 0; ventral, 0, 0, 1, 1, 1. Dorsal spines of twelfth legs, 0, 0, 0, 0, 0; ventral, 0, 0, 0, 1, 1. Dorsal spines of eleventh legs, 0, 0, 0, 0, 1; ventral, 0, 0, 0, 1, 1. Dorsal spines of first legs, 0, 0, 0, 0, 1; ventral, 0, 0, 0, 0, 1. None of the coxae at all armed.

Antennae short; articles (in type) 25.

Eyes composed of few ocelli (6 or less in type) which are arranged in either one or two series; single ocellus decidedly largest as in Tidabius.

Prosternal teeth 2+2; line of apices rather strongly recurved.

Coxal pores circular; uniseriate.

Posterior legs of male short; uniformly a little thickened; without any special lobes or processes.

Claw of female gonopods in type nearly bipartite, the ectal lobe commonly obsolescent, then contracting with all known species of Tidabius. Basal spines moderately slender, acutely and evenly acuminate from very base to apex.

Posterior angles of none of the dorsal plates at all produced.

Small in size (max. length of type species cir. 7.5 mm.).

TYPE.— *S. puritanus*, sp. nov.

DISTRIBUTION.— New England States.

Evidently this genus is closest to the preceding one, Tidabius. From this genus, however, it is clearly distinct in the spining of the legs; *e. g.* the dorsal spines of the anal legs being 0, 0, 1, 0, 0 whereas in all species of Tidabius the corresponding formula is 0, 0, 2, 0, 0; also the ventral spines of these legs are 0, 1, 1, 1, 0, whereas in the other genus the formula is 0, 1, 3, 1, 0 or, more rarely, 0, 1, 3, 2, 0; and the contrast in spining of the penult legs is still greater and equally constant. The prosternum is similar to that of Tidabius though the line of apices of teeth is more strongly recurved than in any species of the latter genus. The basal spines of the female gonopods are conspicuously different in shape, being more slender and not showing any division into broader proximal portion, the sides of which are divergent or parallel, and an acuminate distal portion, so characteristic in all species of Tidabius, but attenuated uniformly from base to apex; etc. The ocelli are fewer in number and show a pronounced tendency to form but a single series. Tidabius and Sigibius may be at once separated from the other two genera dealt with in the present paper by the larger number of antennal articles and by their not having the posterior legs of males characterized by any special processes or lobes.

SIGIBIUS PURITANUS, sp. nov.

DIAGNOSIS.— Dorsal spines of third to eleventh pairs of legs, 0, 0, 0, 0, 1; ventral 0, 0, 0, 1, 1. Dorsal spines of first and second pairs, 0, 0, 0, 0, 1; ventral, 0, 0, 0, 0, 1.

Ocelli 3 to 6 in one or two series.

Prosternum near 1.57 times wider than long, Distance between chitinous spots $2\frac{1}{3}$ times the width at median incision; 3.86 times the dental line.

Coxal pores 2, 3, 3, 3–3, 4, 4, 3.

Claw of female gonopods wide bipartite or with obsolescent third tooth; the two main lobes short and rounded.

Body on average about 7.78 times longer than width of tenth plate.

Head a little longer than wide (42: 40 to 41: 40).

First dorsal plate about 1.7 times wider than long.

Brown to testaceous, often of dilute olivaceous caste; caudal dorsal plates and commonly 1st one darker, reddish brown. Head chestnut, light ferruginous in front of suture.

Description.— The dorsum is brown to testaceous, often of dilute olivaceous caste; caudal plates, and usually also the first one darker, reddish brown or chestnut, and one or more of the plates immediately caudad of the first one often with their posterior borders also of the darker color or the first plate also similarly darker only along its caudal border. Head chestnut in appearance, of a lighter ferruginous color in front of suture, behind which there is present a median black spot extending toward the caudal margin. Antennae mostly dark brown proximally, becoming lighter distad, the distal portion being mostly yellowish or sometimes of a rufous tinge. Prosternum dusky brown, the prehensorial feet lighter, rufous distally. Venter pale; the caudal plates darker, ferruginous to burnt brown; the anterior segments or entire venter suffused with purplish. Legs mostly pale, but the caudal pairs bright yellow or light orange excepting proximally, where they are brown.

Body strongly attenuated cephalad, about 7.8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 39: 38: 42: 50: 50.5: 50 in a female type; in male as 39: 37.5: 39: 46: 47: 46, the female being thus proportionately the broader caudad. Head subcordate, mostly a little longer than wide (42: 40 to 41: 40).

Antennae very short; articles mostly 25, very short; hairs moderately long, not very dense.

Eyes each consisting of from 3 to 6 ocelli arranged in one or two series:— *e. g.*, 1+2; 1+2, 1; 1+3, 2. Single ocellus largest.

Prosternum about 1.57 times wider than long. Distance between chitinous spots $2\frac{1}{3}$ times width at level of bottom of median incision; 3.86 times length of dental line. Median incision moderately wide,

sides straight and strongly converging. Teeth small and acute; the line of apices strongly recurving, the ectal tooth on each side being borne considerably farther forward than the mesal one. Spine inserted at base of outer tooth, scarcely stouter at base than the hairs, becoming slender and finely pointed distad.

First dorsal plate 1.7 times wider than long. Minor plates all with caudal corners obliquely somewhat excised; none with them at all produced.

Coxal pores 2, 3, 3, 3–3, 4, 4, 3; increasing in size distad on each coxa.

Spines of first and second pairs of legs, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of third to eleventh, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of twelfth, $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 0,\ 1,\ 1}$; of thirteenth, $\frac{0,\ 0,\ 1,\ 0,\ 0}{0,\ 0,\ 1,\ 1,\ 1}$; of the penult, $\frac{0,\ 0,\ 1,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$; claws 2; of the anal also, $\frac{0,\ 0,\ 1,\ 0,\ 0}{0,\ 1,\ 1,\ 1,\ 0}$, claws 2.

Posterior legs in male, short, very moderately and uniformly enlarged.

Claw of female gonopods broad; the ectal lobe commonly almost or wholly obliterated, the other two lobes distinct, with the median usually considerably the larger, or sometimes the two lobes are nearly equal and bluntly rounded. Basal spines differing from those of species of Tidabius in being more slender and in being attenuated evenly from the very base to the acutely rounded apex, their being no distal acuminate portion sharply delimited from a basal. Inner edge of first article straight.

Type Locality.— Massachusetts (Cambridge!).

Localities.— Massachusetts (Cambridge! Arlington Heights! Forest Hills! Waverley! Mattapan! Blue Hills! Wellesley! Hough's Neck!); Maine (Orono! Bangor! Hampden! Old Town!).

PLATE 1.

Nampabius virginiensis Chamberlin.

Fig. 1. Prosternum.
Fig. 2. Anterior border of prosternum more highly enlarged, showing teeth, ectal spines and form of mesal incision characteristic of the genus.
Fig. 4. Penult leg of ♂ showing the characteristic process at distal end of tibia.
Fig. 5. Process of penult leg more highly enlarged.

Nampabius embius Chamberlin.

Fig. 3. Left eye, showing characteristic form and arrangement of ocelli (single ocellus at the right of fig.).

Nampabius fungiferopes Chamberlin.

Fig. 6. Penult leg.
Fig. 7. Process of penult leg more highly enlarged.

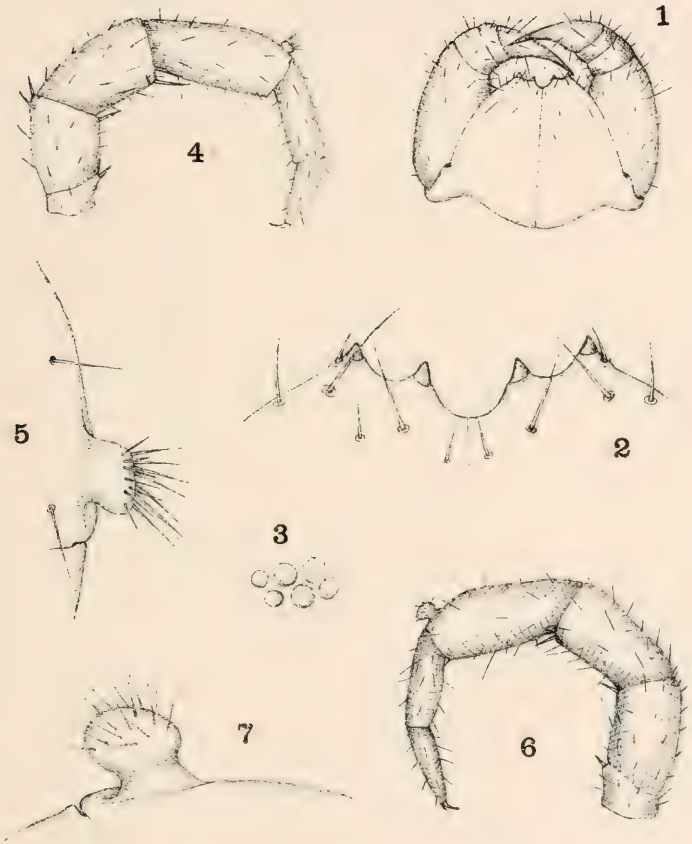
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PLATE 2.

Nampabius georgianus Chamberlin.

Fig. 1. Penult leg, caudal (mesal) aspect.
Fig. 2. Process of penult leg more highly enlarged.
Fig. 3. Anal leg ectal aspect.

Nampabius carolinensis Chamberlin.

Fig. 4. Penult leg, caudal aspect.
Fig. 5. Process of penult leg more highly enlarged.

Nampabius virginiensis Chamberlin. (See also Plate 1).

Fig. 6. Left gonopod showing typical form of claw, basal spines, and proximal article.

Nampabius embius Chamberlin.

Fig. 7. Antenna.

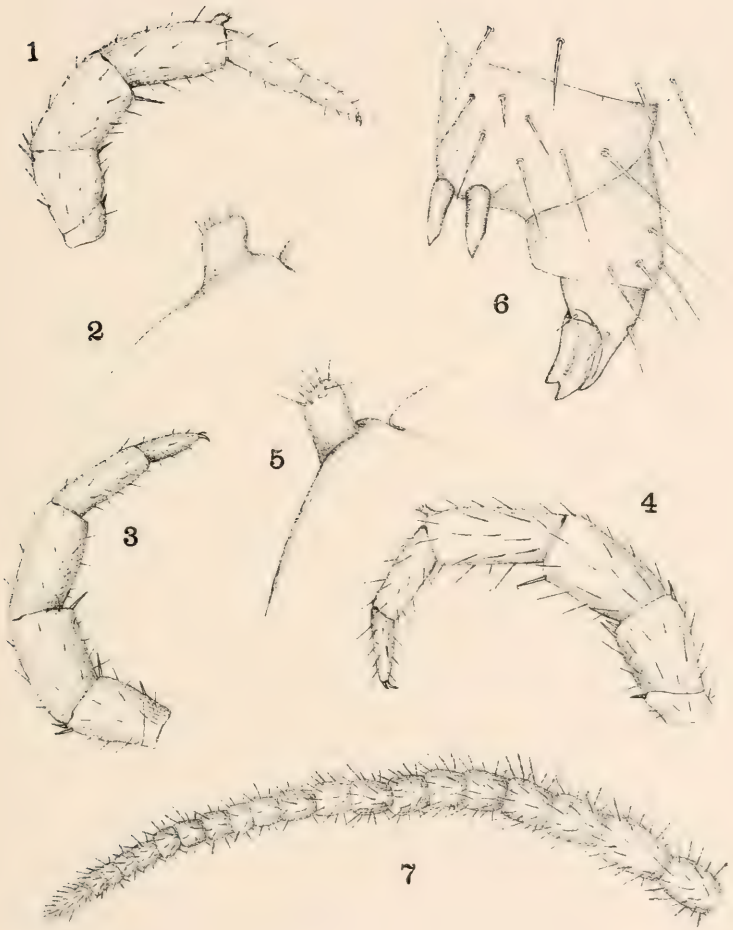
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PLATE 3.

Nampabius parienus Chamberlin.

Fig. 1. Penult leg, caudal aspect.
Fig. 2. Process of penult leg more highly enlarged.

Nampabius tennesseensis Chamberlin.

Fig. 3. Penult leg.
Fig. 4. Process of penult leg more highly enlarged.

Nampabius inimicus Chamberlin.

Fig. 5. Penult leg, caudal aspect.
Fig. 6. Process of penult leg more highly enlarged.

Nampabius virginiensis Chamberlin. (See Plates **1**, **2**).

Fig. 7. Head in outline, showing the more usual form in the genus.

Nampabius georgianus Chamberlin. (See also Plate **2**).

Fig. 8. Head in outline.

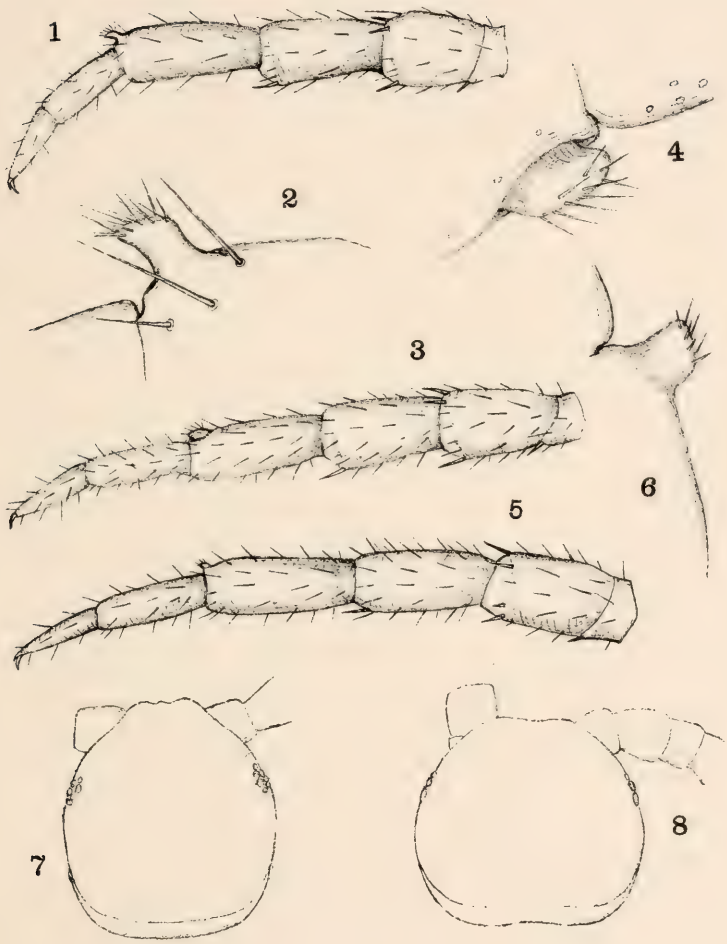
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PLATE 4.

Garibius monticolens Chamberlin.

Fig. 1. Prosternum.
Fig. 2. Anterior border of prosternum more highly enlarged, showing teeth, spines and form of median incision characteristic in the genus.
Fig. 3. Antennae.
Fig. 4. Left eye showing typical form and arrangement of ocelli (single ocellus at left).
Fig. 6. Anal leg, mesal aspect, showing position and usual form of the tibial crest characteristic of males of the genus.
Fig. 7. Tibial crest of anal leg, ectal view, more highly enlarged.

Garibius catawbae Chamberlin.

Fig. 8. Anal leg, mesal view.
Fig. 9. Tibial crest of anal leg, ectal view, more highly enlarged.

Tidabius tivius Chamberlin.

Fig. 5. Right gonopod, showing form of claw and of basal spines characteristic of the genus.

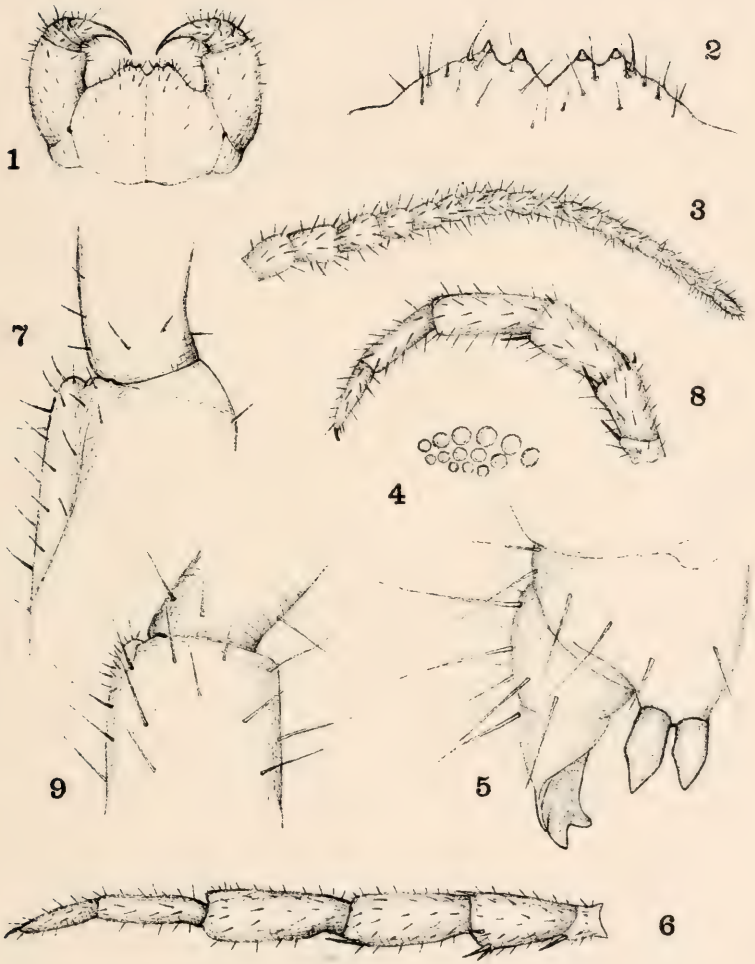
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PLATE 5.

Garibius monticolens Chamberlin. (See also Plate 4).

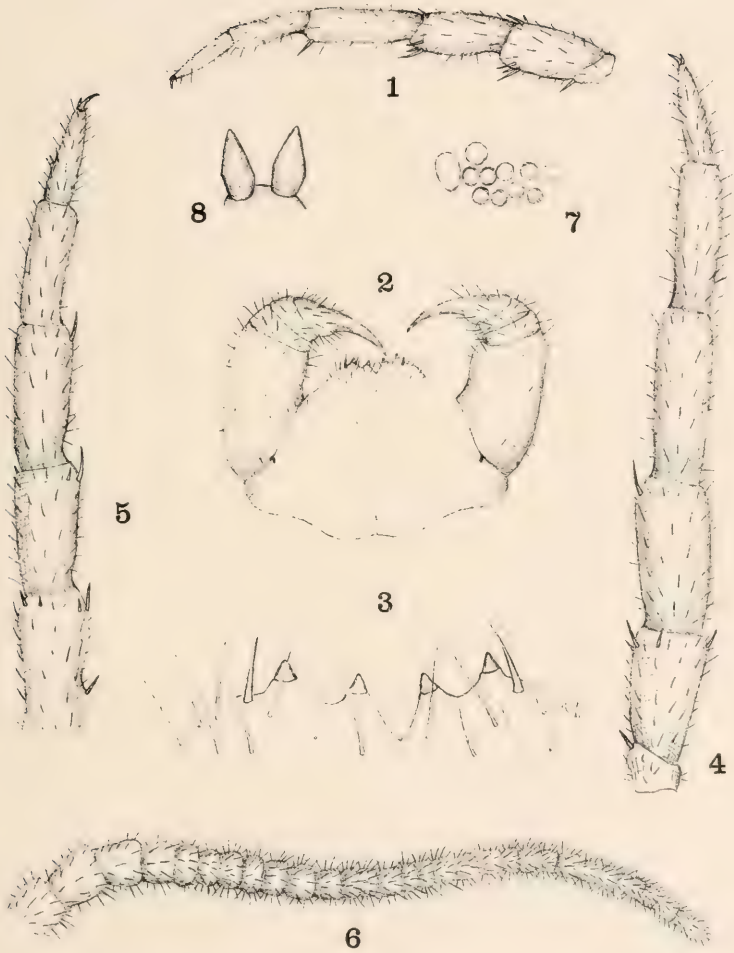
Fig. 1. Penult leg, caudal aspect.

Tidabius tivius Chamberlin. (See also Plate 4).

Fig. 2. Prosternum.
Fig. 3. Anterior border of prosternum showing teeth spines and mesal incision, the latter of the form prevailingly but not exclusively found in the genus.
Fig. 4. Anal leg of ♀, mesal aspect, showing the usual form for both sexes in the genus.
Fig. 5. Penult leg mesal (caudal) aspect.
Fig 6. Antenna, representing the form typical in the genus.
Fig. 7. Right eye, showing characteristic form and arrangement of ocelli, (single ocellus at left of figure).

Tidabius opiphilus Chamberlin.

Fig. 9. Basal spines of left gonopod of ♀.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AT HARVARD COLLEGE.
Vol. LVII. No. 3.

THE GENUS WATOBIUS.

By Ralph V. Chamberlin.

With Two Plates.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
September, 1914.

No. 3.— *The Genus Watobius.*

By Ralph V. Chamberlin.

The genus Watobius, at present known to occur only in the southeastern United States, presents various structural features rendering it of particular interest. In the complete absence of true articular spines from all the legs it is like the Henicopidae; but that it is clearly different from other members of this family appears from the following important characters which it presents:—

1. The eyes are composed of several ocelli.
2. The outer branch of the first maxilla is biarticulate.
3. The sternite of the prehensorial segment is absent, no transverse ventral sclerite or collar being developed.
4. Anal pores are not present in the adult.
5. The gonopods of the male are small, consisting of but a single reduced article.

In addition, it may be mentioned that the claw of the female gonopods is tripartite, whereas in all the Henicopidae it is entire.

The conspicuous modification of the penult and anal legs in the male seems not to be paralleled by any similar secondary sexual development in the Henicopidae unless it be that the genus Marcianella of Attems properly belongs in this family, where it is placed by its author, the type species of the genus, indeed, having been originally described under Lamyctes. However, in the published accounts no direct information is given in regard to such important characters as the mouthparts, the anal pores, or the gonopods; and as the published diagnosis of the genus reveals agreement with Watobius in its more marked and distinctive features otherwise, one is tempted to query whether the two genera do not belong close together. That they are not identical is apparent from the statement made in the original description of *M. triops*, the genotype of Marcianella, that the first leg-bearing segment has a stigma, that only a single accessory claw is present on the legs, and that none of the dorsal plates are produced at their caudal angles. Certainly, the agreement in a combination of characters like the absence of articular spines from the legs, the presence of a tibial spine in place of the spur of the Henicopidae, the presence of several pairs of ocelli, and the modification of the last two pairs of legs in the male, is justification for a suspicion that

further agreement may appear when we have additional knowledge of Marcianella. To be sure Attems states that in points not specified in his diagnosis Marcianella agrees with Lamyctes; but we must remain quite uncertain as to the ground this statement covers. It will be advantageous to reproduce the original accounts of Marcianella and its type species.

MARCIANELLA ATTEMS.

Schulze's Forschungsreise im west-u. zent. Südafrika, 1909, **2**, p. 12.

Jederseits 3 ocellen.
20–21 Antennenglieder.
Alle Rückenschilde hinten abgerundet.
Tarsus der 1–13. Beinpaares einfach, des 14. und 15. Paares zweigliedrig. Am Ende des 5. Gliedes des 1.–12. Beinpaares ein langes Dorn.
Nur eine Nebenkralle vorhanden.
Die 2 letzten Beinpaare des ♂ stark verdickt.
In allen übrigen Punkten mit Lamyctes übereinstimmend.
Genotype.— *M. triops* Attems.

MARCIANELLA TRIOPS Attems.

Lamyctes triops Zool. jahrb., syst. theil, 1908, **26**, p. 186.

Farbe: Kopfschild und Dorsalseite des Hinterendes röthlichgelb, der übrige Körper samt Antennen blassgelb.
Lange 4.5 mm.
20–21 Antennenglieder, die mit schütteren Borstenquirlen versehen sind.
2 × 2 Kieferhüftzähne; die Mittelkerbe ziemlich tief und rund, die Zähnchen mittelkräftig. Jederseits 3 schwarze Ocellen, von denen der mittlere der grösste ist.
Kopfschild länger als breit, hinten gerade abgeschnitten, seitlich gewölbt, vorn abgerundet.
Rückenschilde hinten alle völlig abgerundet, der Hinterrand des 10. und 12. unmerklich eingebuchtet. Die Ränder der Rückenschilde mit kräftigen zerstreuten Borsten.
Ventralplatten mit spärlichen, winzigen Härchen. Alle Beine ganz ohne Dornen aber mit wenigen kräftigen Borsten. 14. und 15. Beinpaar recht stark verdickt, Endbeine mit sehr kleiner Nebenkralle. 1, 1, 2, 2, kreisrunde Hüftporen.
Das 1. beintragende Segment hat ein Stigma; die Tarsen der Beinpaare 1–13 sind einfach, die der 14. und 15. Beinpaare 2 gliedrig.
Locality.— Island of Elba.

Watobius stands rather widely separated from the other known genera of the Lithobioidea in a number of important characters, whence it has seemed advisable to place it in a separate family, the Watobiidae.

The following definition of the family is drawn from the single genus; but so far as concerns the positively stated characters of Marcianella, this genus also complies with the definition. Should Marcianella, however, prove ultimately to be a true henicopid, its parallelism with Watobius in these characters will be truly interesting.

Watobiidae Chamberlin.

Watobiinae Chamberlin, Bull. M. C. Z., 1912, **57**, p. 4.

Labrum mesally deeply incised and bearing the usual large conical median tooth; lateral teeth but weakly developed; (margins of lateral divisions glabrous). Outer branch of first maxillae biarticulate, bearing plumose hairs on mesal surface, but the inner branch, so far as known, bearing almost exclusively simple hairs, in the type genus a single plumose hair appearing at the distal end.

Palpus of second maxillae triarticulate, the distal article bearing plumose hairs over nearly entire length of ventral surface.

Articular spines absent from all legs as in the typical Henicopidae; but a stout spine occurring on tibia at distal end on the anterior side of all but the posterior pairs of legs, this being in the place occupied by the tibial spur in the Henicopidae.

Anal and penult legs modified in the male.

Gonopods of male small, uniarticulate. Anal pores absent in the adult.

Watobius Chamberlin.

Ann. ent. soc. America, 1911, **4**, p. 35.

The median tooth of labrum acute and set in a deep incision as usual, the lateral tooth on each side being set off by a narrow and shallow incision, inconspicuous. Edges of lateral pieces glabrous (in type species). (Plate **1**, fig. 3).

Palpi of second maxillae with the claw divided as usual. Its distal article bearing over nearly entire length of ventral surface plumose hairs similar to those of Lamyctes, there being a stouter, smooth, cylindrical base and a slender plumose distal filament, or there may be two or more filaments on a single base. (Plate **1**, fig. 5).

Inner branch of first maxillae clothed almost exclusively with simple hairs, there being (in the type species) but a single plumose hair, this being born at the apex. Outer branch bearing plumose hairs on mesal surface.

Mandibles bearing four sets of plates set obliquely, each plate being tridentate, the tooth toward the convex side being smallest; at the cephalic corner a lower chitinous elevation. About eight pectinate aciculi are present. There is a row of plumose hairs closely applied to surface on the convex side a little proximad of the base of dental plates. (Plate **1**, fig. 4).

Eyes consisting of a patch of ocelli on each side.

Organ of Tömösvary small; situated between ocelli and base of antennae on ventral side of head. (Plate **1**, fig. 2).

Antennae short; consisting of near twenty articles.

Prosternal teeth 2+2. Prosternal spine, at base of outer tooth, hair-like. (Plate **1**, fig. 6).

No spiracle on first leg-bearing segment.

(Posterior angles of ninth, eleventh, and thirteenth dorsal plates, in type, produced).

First fourteen pairs of legs with two accessory claws.

Tarsi of anterior legs indistinctly biarticulate, a chitinous hinge not at all developed. Anterior legs with tibial spine. (Plate **2**, fig. 2).

Coxal pores present on last four pairs of coxae, few, small, in a single series.

Claw of female gonopods tripartite; basal spines 2+2. (Plate **2**, fig. 6). Second joint glabrous dorsally as in Lamyctes, etc.

Gonopods of male very small, wart-like. (Plate **2**, fig. 5).

Type.— *W. anderisus* Chamberlin.

Watobius anderisus Chamberlin.

Ann. ent. soc. America, 1911, **4**, p. 35, pl. 3, fig. 4, 5.

Description.— Dorsum brown, the caudal segments often darker. Head and prehensorial feet conspicuously darker, deep brown or brownish black. Antennae brown, pale distad. Legs light brown, the posterior pairs having a purplish tinge; the anal and penult pairs abruptly pale, yellow to almost white, distad of the femur, the tibiae of the penult legs being especially light. A purplish or violet pigment existing in the deeper tissues diffuses in alcoholic specimens, tinging the various tissues and coloring the alcohol.

Body strongly attenuated cephalad and caudad from the tenth leg-bearing segment. In the male the body is 7.25 or less times longer than the width of the tenth dorsal plate; but the female appears to be more slender the body being about 7.7 times longer

than the width of the tenth plate. The body is sparsely clothed with short and mostly stout bristles or setae which are rather longer on the head, and also longer and more numerous on the legs, which have fewer fine hairs intermingled; the bristles of the tarsi distinctly more slender than those of the proximal segments.

Head clearly longer than wide (41:37); widest at the level of the eyes, with the sides caudad of this moderately converging and only weakly curved; cephalad rounding strongly mesocephalad to the relatively wide anterior margin between the antennae; caudal margin nearly straight, being a little incurved mesally and becoming weakly convex toward the rounded corners.

Antennae short, being close to one third the length of the body; composed of from 20 to 22 articles of which the proximal ones are long, the second being longest, the articles decreasing regularly in length and thickness from the second distad, the ultimate article acuminate.

Eyes composed mostly of nine ocelli, consisting of a large single ocellus in the caudal position and of eight smaller ones in three series; thus, 1+3, 3, 2. Organ of Tömösvary small, circular in outline, lying between eye patch and base of antenna.

Prosternum about 1.6 times wider than long. Anterior border produced well forward, laterally rounded. Mesal incision wide, semicircular in outline or nearly straight at bottom. Teeth 2+2, conical, subequal, light brown in color; line of bases and of apices recurved. (Plate 1, fig. 6). Chitinous lines fine, complete.

Dorsal plates low, but weakly convex; wide, the edges extending out free from the body laterally; lateral and caudal margins somewhat elevate, most plates broadly and shallowly depressed transversely near middle of length, much roughened by numerous, irregular longitudinal rugae. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates produced. Posterior angles of the first, third, and fifth plates strongly rounded; the caudal margin of the eighth straight, bent a little obliquely at each end; posterior angles of sixth and seventh a little extended but well rounded; caudal margins of tenth and twelfth plates truncate, not bent at ends. Caudal margin of second and fourth plates convex at middle, incurving each side and then a little bent caudad at ends, the angles appearing very slightly produced caudad but well rounded.

Most ventral plates distinctly depressed in a line parallel with and a little removed from each lateral margin and on the more caudal plates also with two more mesal sulci parallel with the submarginal ones; plates also depressed in a broad band transversely, the caudal

edge of this band being more deeply, sharply impressed as is also the anterior edge, the latter furrow being convex; also a number of finer and in large part interrupted transverse impressed lines or sulci.

Legs of moderate length. Tarsi slender, biarticulate but with no articular hinge between the joints excepting in the last two pairs. All legs with three claws, but one of the accessory claws in the anal legs obsolescent and the other relatively reduced. Legs armed chiefly with stout spinescent setae which are especially conspicuous on the ventral surfaces of proximal joints, all the hairs of the tarsi distinctly finer.

Penult legs in the male with the fifth joint or tibia very strongly enlarged, subcomplanate above; elevated into a laterally compressed, shortly pilose prominence or keel at the distal end of the dorsal surface. The tarsus slender, contrasting strongly in thickness with the enlarged tibia. (Pl. 2, fig. 3).

Anal legs comparatively slender, the tibia about equal in thickness to the femur, presenting on dorsal surface at distal end a shortly pilose elevation in form and size like the one on the corresponding joint of the penult legs. (Pl. 2, fig. 4). Anal legs in both sexes clearly longer than the antennae, their ratio being about 11:9.

Coxal pores small, circular, 2, 2, 2, 2 to 2, 3, 3, 3, in number and arrangement; the porigerous area plane or a little convex, not at all depressed or furrowed.

Claw of the gonopods of female rather broad, deeply excavated on mesal side, tripartite with the middle tooth much largest, the lateral subequal. Basal spines on each side subequal, conical, excavated dorsally from near base. Second article of gonopods glabrous dorsally.

Gonopods of male small, rounded, wart-like.

Length of male mostly from 7.75 to 8.5 mm.; of female mostly from 9 to 9.5 mm.

Type.— M. C. Z., No. 83, Alabama: Anniston, 28 July, 1910, R. V. Chamberlin.

Paratypes.— M. C. Z., No. 84, Alabama: Thomasville, 20 July, 1910; M. C. Z., No. 85, Georgia: Tallulah Falls, 1 August, 1910; M. C. Z., No. 86, Georgia: Bremen, 29 July, 1910.

All the specimens were collected by the author and were found chiefly under loose layers of fallen leaves.

PLATE 1.

PLATE 1.

Watobius anderisus Chamberlin.

Fig. 1. Dorsal view of head.
Fig. 2. Ventral view of part of head, showing eyes and organ of Tömösvary.
Fig. 3. Labrum.
Fig. 4. Distal end of mandible.
Fig. 5. End of palpus of second maxilla.
Fig. 6. Free border of prosternum, showing teeth, spines, etc.

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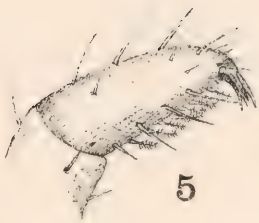
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PLATE 2.

PLATE 2.

Watobius anderisus Chamberlin.

Fig. 1. Antenna.
Fig. 2. Fifth leg, anterior view, showing tibial spine.
Fig. 3. Penult leg of male.
Fig. 4. Anal leg of male.
Fig. 5. Ultimate segments of male, ventral view.
Fig. 6. Gonopods of female with sternite of preceding segment, ventral view.

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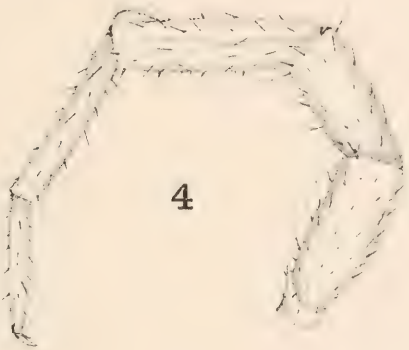

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OCT 23 1916

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THE LITHOBIID GENERA OABIUS, KIBERBIUS, PAOBIUS, AREBIUS, NOTHEMBIUS, AND TIGOBIUS.

By Ralph V. Chamberlin.

With Ten Plates.

CAMBRIDGE, MASS., U. S. A.:
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October, 1916.

No. 4.— *The Lithobiid Genera Oabius, Kiberbius, Paobius, Arebius, Nothembius, and Tigobius.*

By Ralph V. Chamberlin.

The genera treated in this paper are composed of certain, mostly small, species previously embraced in the artificial group Archilithobius of Stuxberg and in part falling within the similarly artificial but more restricted group separated by Verhoeff in 1905, under the name Monotarsobius. While a considerable number of the species agree with Monotarsobius in the one distinctive character used in defining it, *i. e.*, in having the anterior tarsi undivided, none of them is really congeneric with the designated type, *Lithobius curtipes* C. Koch.

It should be mentioned that there is considerable uncertainty oftentimes in deciding whether a tarsus of a lithobiid is to be regarded as one-jointed or two-jointed, since there is every gradation between species having tarsi composed of two distinct joints freely movable at their junction and those having tarsi with no trace of division whatsoever. Between these two conditions are tarsi with two parts indicated merely by a paler, less chitinous, transverse line, but with no sign of a real suture; tarsi in which the distal part is abruptly somewhat narrower and is also further set off by the pale transverse line; tarsi like the last mentioned but with a more distinct suture-like line of division about the ventral half or less; and, finally tarsi in which the suture is complete or essentially so but in which movement between the two joints is not possible, or is restricted to a more or less limited flexion. It is clear, then, that in speaking of the tarsus simply as divided in a particular lithobiid, one may not be sufficiently definite. On the one hand, the species might be one in which the tarsal division had between them a true articular hinge; or, at the other extreme, one in which two parts to the tarsus are faintly indicated but with no power of any movement between them. In generic definition the character should be used with care and always in conjunction with others. It is advisable to study the condition of the tarsus in specimens that have been cleared and mounted.

The genera here under consideration are, so far as at present known, almost confined to the Pacific coast region of North America, no species having been found as yet east of the Sierra Nevada Mts. excepting in the case of Paobius. These small lithobiids occur com-

monly under the bark of logs and especially under layers of fallen leaves in woods and canyons. The smaller forms, as species of Oabius, are often to be secured in considerable numbers by sifting. In the eastern and southeastern states they are replaced by genera such as Tidabius, Tunabius, Garibius, etc., of similar general appearance and habits.

Developmental stages.

In all Chilopoda Anamorpha the identification and precise description of the stages between embryo and adult is of much importance. As such immature forms are described for many of the species considered in the present paper, the following brief general account is given.

The eggs of lithobiids are rich in yolk, comparatively large and spherical or subspherical in form. They are laid, as I have observed in several species (*e. g.* in *Oabius pylorus*) one at a time, each as passed from the body being ordinarily grasped between the claws of the gonopods and often carried about for a short time before being deposited in the dirt which adheres to the sticky surface and makes subsequent detection of the egg difficult. In one case I secured a number of eggs of *Oabius pylorus* from individuals kept in captivity; but I have found it generally difficult to secure eggs in any number and with certainty as to the species from which they come. The females pay no attention to the eggs after they have once been deposited. In this they contrast strongly with Geophilus and other genera of the Epimorpha in which the eggs are laid in a mass about which the mother coils the body until some time after the young have issued from the eggs. The eggs of lithobiids are laid in the same places as are normally frequented by the adults. But while the eggs themselves are not often seen, the young in all postembryonal stages are very common. The initial determination of the species to which given immature individuals belong is often difficult and must be made with great caution unless found in a place wholly usurped by a particular species or else are closely connected with the adult by intermediate stages. In rare cases a strongly distinctive character may be present even comparatively early.

Pullus I. The term pullus is here used to designate postembryonal stages in which the full number of legs has not yet been acquired.

The development of the central nervous system and of the somites and the appendages of the head and anterior region of the body proceeds in essentials as in the Epimorpha and Insecta. There is,

however, a marked and well-known difference from the Epimorpha, — the chief difference upon which the Anamorpha as a group is based — in that the formation and development of the posterior segments of the trunk does not proceed simultaneously with that of the more anterior ones but occurs in successive and well-marked stages after emergence from the egg. Thus, instead of leaving the egg with the full number of segments and appendages and in the general form of the adult, the lithobiids hatch out with but seven pairs of developed and functioning legs with between the last of these and the telson three pairs of rudimentary limbs or limb-buds. While the anterior spiracles appear early, the posterior ones of necessity appear late and successively with the intercalation of the somites concerned. At the time of hatching the head and its appendages and the prosternum and prehensors have the general adult form and appearance, though, of course, prosternum, eyes, and other parts undergo subsequent progressive modifications. The embryo just before hatching, the so-called foetus, is similar in appearance excepting that only one pair of limb-buds exists caudad of the seventh pair of legs. The total number of segments in the newly hatched individual or pullus of the first stage is eighteen; of these each of the sixteen between protocephalon and telson corresponds to a pair of coelomic sacs and bears a pair of appendages. The eighteen segments are as follows: —

1.	Protocephalon	Head [1]
2.	Preantennal (first metamere)	
3.	Antennal (second metamere)	
4.	Mandibular (third metamere)	
5.	First maxillary (fourth metamere)	
6.	Second maxillary (fifth metamere)	

[1] Favorable material also of *Scolopendra polymorpha*, *Scolopocryptops gracilis* and *sexspinosus*, and *Linotaenia laevipes* seems to show clearly that the head in all chilopods is thus constituted of six primary segments and precisely as in insects. The appendages of the adult head likewise correspond with those of insects excepting that the antennae of insects homologize with the preantennae of chilopods and the premandibular appendages (in Campodea, etc.) with the antennae. The following tabulation shows the homologies.

Segment	Nerve Mass	Appendages in Chilopods	Appendages in Insects
Protocephalon	Procerebrum	0	0
Metamere 1	Deutocerebrum	preantennae	antennae
Metamere 2	Tritocerebrum	antennae	premandibular appendages
Metamere 3	Mandibular ganglion	mandibles	mandibles
Metamere 4	First maxillary ganglion	first maxillae	first maxillae
Metamere 5	Second maxillary ganglion	second maxillae	second maxillae

7. Prehensorial (sixth metamere)
8–14. With developed legs (seventh to thirteenth metameres)
15. With partly developed legs (fourteenth metamere)
16–17. With limb-buds (fifteenth and sixteenth metameres)
18. Telson.

In this stage (pullus I) and the immediately succeeding ones in all lithobiids there are clearly evident in the anal segment or telson a pair of glands, the so-called anal glands, which degenerate and disappear during the agenitalis stage. These are identical in structure and are unquestionably homologous with the anal glands persisting throughout life in all members of the Henicopidae (*cf.* Chamberlin, Bull. M. C. Z., 1912, **57**, p. 4, 5, pl. 1, fig. 8, 9). The two anal glands open through a single pore on the median ventral line in front of the anus. Each is a simple unbranched sac in structure very much like the coxal sacs of the posterior pairs of legs. Verhoeff (Zool. jahrb. Suppl., 1905, **8**, p. 227) believes that the anal glands in the immature lithobiids have the same function as the coxal glands which they supposedly supplement and that the disappearance of the glands is correlated with the appearance of the coxal glands. It should be noted, however, that these glands retain their full development throughout life in all Henicopidae, including Zygethobius in which coxal pores exist on five pairs of legs instead of on only the usual four. A pair of anal glands opening separately has long been known to exist in many adult geophiloids, and in fact it was supposed that they were peculiar to these forms, Haase, for example, asserting in his Indisch-Australischen Myriopoden (Abh. berich. K. zool. anthrop.-ethnogr. mus. Dresden, 1887, no. 5, p. 11) that "Analdrüsen finden sich nur bei den Geophiliden."

Individuals of the first pullus stage may be recognized in general by the following combination of characters: — Seven pairs of fully developed legs, an eighth pair of partly developed and segmented ones, followed by two pairs of simple buds. Anal glands fully developed and conspicuous. Antennae with ten to twelve articles. Prosternal teeth distinct though small, 2 + 2 in number. Nourished by yolk still retained in the alimentary canal.

Pullus II. Eight pairs of functional legs followed by two pairs of unsegmented leg-buds. Anal glands fully developed. Antennae constantly with fourteen articles. Food for the first time ingested at mouth and often found mixed with remnants of yolk in the intestine.

Pullus III. With ten pairs of fully developed and functioning legs followed by two pairs of limb-buds. Anal glands fully developed. Number of articles of antennae variable from species to species and among individuals of the same species.

Pullus IV. With twelve pairs of functioning legs followed by three pairs of limb-buds. A pair of coxal glands opening on the twelfth coxae. Anal glands fully developed. Number of articles of antennae various.

Pullus V. A stage detected only in certain species. Like pullus IV excepting that the thirteenth legs are partly developed and show traces of segmentation, the fourteenth and fifteenth pairs remaining as simple buds and a pair of glands are present on the thirteenth in addition to those upon the twelfth coxae.

Agenitalis I. With the fifteen pairs of legs fully developed and functioning and the two genital segments (genital and pregenital) formed. Thus the full number of segments, namely twenty-five, is first attained in this stage. A single pair of coxal glands on each of the last four pairs of coxae. Anal glands still evident but showing distinct signs of degeneration. No spines on the last trochanters. The gonopods exist as small buds.

Agenitalis II. Like the preceding excepting that a spine is present on the trochanter of each of the fifteenth legs and that there are usually two pairs of coxal pores on each of the last four pairs of coxae. The anal glands have almost completely disappeared.

Immaturus.— In this stage the gonopods of the female have become more distinct and always show two and sometimes three articles; on the first joint of each there is a single small spine or point; claw not yet evident or showing only as a slight point. Gonopods of male simple and wholly glabrous. The anal glands have completely disappeared. It is sometimes desirable to speak of an early as distinguished from a late *immaturus*, the stage seeming often at least not to correspond to a single moult.

Praematurus.— In this stage in the present series of genera the female gonopods have 2 + 2 basal spines with the inner one on each side only half or less the length of the outer one; the three joints of the gonopod are distinct and bear an increased number of bristles; the claw is larger and when lobate in the adult shows at least the beginning of the lobes here. Gonopods of male more distinct and each may bear a bristle. As with the *immaturus*, it is sometimes desirable to speak of early and late *praematurus*.

Pseudomaturus.— It is sometimes important to distinguish individuals that have first attained the external features of the adult but which have not yet produced ripened sex-cells from older and sexually ripe individuals. Such individuals are commonly of smaller size, less strongly chitinized with often paler color, and may show fewer antennal joints and coxal pores and small differences in the gonopods of the female. The spining on some of the legs may also differ.

Key to the Genera.

a. Tarsi of anterior legs strictly entire with no trace whatsoever of a suture or dividing line.

b. Anal legs of male without any lobes or other special modification on any of the joints.....*Oabius*, gen. nov.

bb. Sixth joint of anal legs of male bearing on dorsal surface at distal end a conspicuous process.....*Tigobius*, gen. nov.

aa. Anterior tarsi with division indicated by transverse pale line, difference in diameter, or by a partial or complete suture, in some permitting more or less flexion.

b. The first seven or more pairs of legs with but a single dorsal tibial spine and the penult with none; lateral margin of head continuous, with no abrupt break or interruption or such but obscurely indicated.....*Paobius*, gen. nov.

bb. Legs between first (or, more rarely, second, third, or fourth) and twelfth pairs with two dorsal tibial spines, one also being always present on penult legs. Head on each side with a distinct marginal interruption or break or this very rarely obscure.

c. Anal legs in both sexes deeply and broadly longitudinally furrowed along the mesal side or conspicuously flattened; none of the coxae laterally armed...*Kiberbius*, gen. nov.

cc. Anal legs not thus modified; last two pairs of coxae laterally armed.

d. Articles of antennae normally 22; tibia of anal legs of ♂ bearing at distal end on ventral side a conspicuous process or lobe; (claw of ♀ gonopods entire).
Nothembius, gen. nov.

dd. Articles of antennae normally 20; anal legs of ♂ with no special process or lobe; (claw of ♀ gonopods either entire, or bipartite or tripartite with lateral teeth small).....*Arebius*, gen. nov.

Oabius, gen. nov.

Head with the usual lateral marginal interruptions.

Antennae short, composed normally of twenty articles.

Eyes composed of seriate ocelli which are comparatively few and small; the single ocellus but weakly, differentiated and but little or not at all enlarged (Oabius *sens. str.*); or ocelli larger and the single one conspicuously the largest (subgenus Nyctobius).

Prosternal teeth 2 + 2; line of apices usually a little recurved. Spine slender, attenuated distad with apical portion bristle-like. Mesal incision v-shaped, varying in proportionate size.

Posterior angles of none of the dorsal plates produced.

Coxal pores small and circular; uniseriate.

Claw of ♀ gonopods tripartite, the lateral lobes typically equal and at or near the same level, the median lobe moderate, larger than the lateral but not greatly so. Basal spines 2 + 2, in the more typical group of species slender and acuminate, but varying to short and proportionately broad (*c. g.* subgenus Nyctobius).

Tarsi of anterior legs entire with no trace of division. (Plate 1, fig. 2).

Posterior legs moderately uniformly inflated, with no special lobes or other modifications. Last one or two pairs of coxae laterally armed. Excepting in *O. sastianus*, which is of somewhat doubtful position, the third joint of none of the legs cephalad of the twelfth or eleventh pairs bearing three dorsal spines (rarely three present on tenth). Fifth joint of all legs between first (rarely second) and twelfth pairs armed with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0 or rarely 1, 0, 3, 0, 0; ventral nearly always 0, 1, 3, 2, 0, rarely 0, 1, 3, 3, 1; claw single or more rarely two. Dorsal spines of penult legs 1, 0, 3, 1, 1 or 1, 0, 2, 1, 1; ventral 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws only 2, or an anterior obsolescent one appearing as a mere point. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 or 1, 0, 2, 1, 1; ventral, 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2 and sometimes even to 0, 0, 2, 3, 2 or 0, 0, 2, 3, 1. Dorsal spines of twelfth legs 1, 0, 3, 1, 2 and 1, 0, 2, 1, 2 or 0, 0, 2, 1, 2 to 1, 0, 3, 1, 1 and 1, 0, 2, 1, 1; ventral, 0, 0, 3, 3, 2 to 0, 0, 2, 3, 2 and 0, 0, 2, 3, 1. Dorsal spines of eleventh legs 0, 0, 3, 2, 2 and 0, 0, 2, 2, 2, rarely to 0, 0, 0, 2, 2; ventral, 0, 0, 2, 3, 2 to 0, 0, 1, 2, 1. Dorsal spines of first legs mostly 0, 0, 2, 2, 1, more rarely 0, 0, 2, 2, 2 or 0, 0, 1, 1, 1; ventral, 0, 0, 1, 2, 1 or 0, 0, 2, 3, 1, rarely to 0, 0, 0, 1, 1.

Length 12 mm. and under.

TYPE.— *O. pylorus*, sp. nov.

It may be found desirable further to restrict this genus when the lithobiids of the Northwest, in particular, are more exhaustively known. The larger number of the species and the more typical group occur in California; but other species are known from as far north as Alaska (Forrester Island). The species are small forms of which most are of some shade of yellow or orange, the latter color being more commonly confined to the head and caudal region. The posterior pairs of legs are nearly always brightly colored, being mostly bright yellow or orange, at least distally.

The following key is applicable, only to adults. It seems hardly necessary to suggest the examination of several individuals as a guard against error. A specimen cleared and mounted in balsam is commonly very convenient for examination of spining, prosternum, etc.

Key to Species of Oabius.

a. Anal leg with but one claw; single ocellus not at all or but slightly enlarged..... *Oabius sens-str.*

b. Dorsal spines of anal legs 1, 0, 3, 0, 0. . *O. tabiphilus*, sp. nov.

bb. Dorsal spines of anal legs 1, 0, 3, 1, 0.

c. Ventral spines of anal legs 0, 1, 3, 3, 1 or 0, 1, 3, 2, 1. *O. sastianus* (Chamberlin)

cc. Ventral spines of anal legs 0, 1, 3, 2, 0. (Third joint of only the last 2 to 4 pairs of legs with 3 dorsal spines, the others with but 2 or 1).

d. Third joint of third to near tenth pairs of legs unarmed either dorsally or ventrally.

e. Dorsal spines of twelfth legs 0, 0, 2, 1, 2; ventral spines of first legs 0, 0, 0, 1, 1 or 0, 0, 1, 1, 1.

f. Ocelli normally in a single elongate series, but this sometimes irregular.....*O. patonius* (Chamberlin)

ff. Ocelli normally in 2 short series with more in the upper one than in the lower. *O. patonius flavus*, var. nov.

ee. Dorsal spines of twelfth legs 1, 0, 3, 1, 1; ventral spines of first legs 0, 0, 1, 2, 1 or 0, 0, 0, 2, 1. Ocelli in 1 series or with 1 or 2 ocelli above the others. *O. patonius micrus*, var. nov.

dd. Third joint of all legs armed dorsally and ventrally.

e. Dorsal spines of twelfth legs normally 1, 0, 3, 1, 2 or 1, 0, 2, 1, 2.

g. Ventral spines of penult legs normally 0, 1, 3, 2, 1; third joint of twelfth and thirteenth legs normally with three ventral spines; head and tenth dorsal plate of nearly same width. . .*O. pylorus*, sp. nov.

gg. Ventral spines of penult legs normally 0, 1, 3, 3, 1; third joint of twelfth and thirteenth legs normally with two ventral spines; head distinctly narrower than the tenth plate. . .*O. fratris*, sp. nov.

ee. Dorsal spines of twelfth legs normally 1, (0), 0, 3, 1, 1 or 1, 0, 2, 1, 1.

f. Ventral spines of penult legs 0, 1, 3, 3, 1.

O. dissimulans, sp. nov.

ff. Ventral spines of penult legs 0, 1, 3, 3, 2.

g. Basal spines of ♀ gonopods not much differing in size, long, being nearly five times longer than width at middle (Plate **2**, fig. 5); head equal in length and breadth; first dorsal plate not narrower than the third. . .*O. tiganus* (Chamberlin)

gg. Basal spines of ♀ gonopods with the inner considerably smaller than the outer, proportionately but three fourths or less as long as in *O. tiganus* (Plate **2**, fig. 9); head wider than long; first plate narrower than the third.

O. ulcorus, sp. nov.

aa. Anal leg with two claws; single ocellus considerably largest; basal spines of ♀ gonopods short and broad.

Nyctobius, subgen. nov.

b. Outer basal spine of ♀ gonopod conspicuously longer and more robust than the inner (Plate **3**, fig. 5); prosternum less than 1.5 times wider than long; length 8–10 mm.

O. decipiens, sp. nov.

bb. Outer spine of ♀ gonopod but little longer than the inner and not more robust (Plate **3**, fig. 4); prosternum near 1.65 times wider than long; length typically 7.5 mm. or less.

O. ineptus, sp. nov.

Fig 1.— Distribution of Oabius.

Oabius pylorus, sp. nov.

Plate **1**, fig. 6; Plate **2**, fig. 1, 2.

Diagnosis.— Very slender, with head and tenth tergite of nearly same width. Yellow to pale testaceous; head light orange with frontal region paler. Ocelli three to six in one series, rarely in two; caudal ocellus not enlarged. Prosternum 1.62 to 1.68 times wider than long; distance between chitinous spots 3.5 times dental line; sinus very narrow. Claw of female gonopods with lobes not much differing in length; basal spines very slender, distal division long, acute. Coxal pores 2, 3, 3, 2 to 2, 4, 4, 3. Anal leg with claw single. Third joint of all legs armed dorsally and ventrally, the ventral spines of twelfth and thirteenth normally three. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 2, 1 or, rarely, 0, 1, 3, 3, 1; of twelfth, dorsal, 1, 0, 3, 1, 2 or 1, 0, 2, 1, 2; of first, ventral, 0, 0, 3 (2), 1 or 0, 0, 2, 3, 1. Length 10 to 12 mm.

Description.— Dorsum yellow to pale testaceous. Head light orange, the frontal region paler. Antennae like head proximally, usually becoming yellow distally. Prosternum and prehensorial feet light orange. Venter yellowish, with the posterior plates light orange. Legs dilute yellow, more deeply pigmented distad, the last two pairs usually bright yellow.

Body very slender with the sides subparallel, the tenth plate being of same width as head or nearly so; third plate narrower than the first; eighth and twelfth of same diameter. Body usually fully 9.5 times or more longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates, to each other nearly as 31:29:27.5:30:31:30.

Head as long as wide or somewhat longer (31:30 or occasionally even 32:30), apparently relatively broader in males than in females; widest a little back of eyes from where the sides converge to breaks and again at about same angle to the rounded caudal corners. Hairs long and sparse on anterior portion, becoming both shorter and fewer caudad.

Antennae very short, reaching to fourth segment when shortest or toward middle of fifth when longest. Moderately narrowing distad but the terminal portion not very slender. Articles short and subcylindric or each a very little enlarging distad. Hairs long and rather coarse, only moderately dense.

Each eye (Plate 1, fig. 6) consisting mostly of from four to six ocelli arranged in a single series or rather rarely with one or two crowded into a more dorsal position and producing a double series. The most common number and arrangement noted is 1 + 3; others are 1 + 4; 1 + 2; 1 + 5; 1 + 1, 3; 1 + 2, 2; and 1 + 2, 3.

Prosternum from 1.62 to 1.68 times wider than long. Distance between chitinous spots 2.3 times the width at level of bottom of mesal incision; 3.5 times the length of dental line. Median sinus narrow; the sides nearly parallel or but little converging caudad; rounded at bottom. Teeth moderate, 2 + 2, distally rounded, the inner larger than the outer and the line of apices straight or slightly recurved. Spines distally bristle-like, becoming stout at base.

First dorsal plate about 1.63 times wider than long. Sides weakly excurved, diverging from the rounded caudal corners cephalad to near the anterior end where they bend in a little. Anterior minor plates with the caudal corners simply rounded; posterior minor plates with caudal corners obliquely excised.

Ventral plates with a median impressed pit caudad of middle, showing rather weakly on the more posterior plates. Lateral furrows are also traceable. A v-shaped impression may be evident on the last two plates.

Coxal pores small, circular, 2, 3, 3, 3; 2, 3, 4, 3; 2, 4, 4, 3. The most proximal on each coxa often minute.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,2,3,1}$, $\frac{0,0,2,2,1}{0,0,1,3,1}$ or $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the second to eleventh pairs, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,3,3,2}$ or occasionally on one side only, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of penult, $\frac{1,0,3,1,1}{0,1,3,2,1}$ or very rarely, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, with the claw single. Last two pairs of coxae laterally armed.

Posterior legs short. In both male and female the anal and penult legs are uniformly and only moderately enlarged, with the third, fourth, and fifth, but especially the fourth, joints simply and rather weakly longitudinally dorsally furrowed. The penult legs in the female tend to be more slender relatively than in the male.

Gonopods of male small and pale, wart-like, often concealed; each bearing normally two bristles.

Claw of female gonopods (Plate 2, fig. 1) proportionately wide, concave and well curved; tripartite, with the divisions not much differing in length. Spines (Plate 2, fig. 2) slender, the sides subparallel from base to beginning of the long and acutely acuminate distal portion. Bristles of third article three or four; of the second, four

or five; of the first mostly six. Median process of pregenital sternite short, distally truncate.

Length 10 to 12 mm. A female 11 mm. long has antennae 4 mm. and anal leg also 4 mm. long, the tenth plate being 1.13 mm. wide.

Pseudomaturus.— Coloration as in *maturus* excepting as a rule more pale or dilute.

Each eye composed of three or four ocelli; thus, 1 + 2 or 1 + 3; with the single ocellus much smaller than the second.

Coxal pores 2, 2, 2, 2 to 3, 4, 4, 3.

Gonopods of female practically as in adult; claw a little smaller and paler; spines also slightly more slender and paler; fewer long bristles present.

Spining of legs as in *maturus*.

Praematurus.— Coloration more dilute than in *maturus* with the legs whitish or yellowish white, excepting the posterior pairs which are yellow.

Antennae having the full number of twenty articles, these being somewhat shorter relatively than in the adult and each proportionately somewhat thicker distad.

Each eye in all specimens studied consisting uniformly of three ocelli; thus, 1 + 2, the posterior eye of series, *i. e.*, the median one of the three, much the largest, the single ocellus being very small.

Line of apices of prosternal teeth straight. (Measurements in one specimen gave prosternum as but 1.55 times wider than long).

As in adult, body slender, being from 9.5 to 10 times longer than width of tenth plate. Head may be relatively slightly narrower. Widths of head and of first, third, eighth, tenth, and twelfth plates in a female are to each other as 42:38:38:42:43:43.

Coxal pores 2, 2, 2, 2, to 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the second and third, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the fourth to seventh inclusive, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the eighth, $\frac{0,0,1,2,2}{0,0,1,2,2}$ or $\frac{0,0,1,2,2}{0,0,1,3,2}$; of the ninth and tenth, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,1,3,2}$ or $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,2,1,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,2,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,2,0}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed.

Claw of female gonopods short and thin; the three teeth present, these acute, the outer or most ventral somewhat smallest and nearest base, the others differing but little from each other. Distal joint with two bristles, the second with three, the first with four or five. Basal spines 2 + 2, attenuated regularly from base to the acutely

pointed apex; inner spine at most but little exceeding half the length of the outer and from that varying in the younger forms to a mere point. Process of preceding sternite as in *maturus*.

Length from about 6.75 mm. to 7.75 mm. In a specimen 6.8–7 mm. long, the antennae are 2.5 mm. and the anal legs 2.3 mm. long.

Immaturus.— Coloration as in the *praematurus* or but slightly paler.

Head distinctly longer than wide (39: 37 to 36: 33.5).

Antennae with the twenty articles already present, but these relatively shorter and more closely compacted than in the adult. Ultimate article relatively very long. Bristles rather sparse.

Each eye composed of three ocelli; *e. g.*, 1 + 2. Single or most caudal ocellus smallest, the second one, or first of series proper, largest. Ocelli not contiguous.

Prosternal teeth and median sinus very nearly same as in adult, the line of apices being straight or sometimes even slightly procurved. (Prosternum 1.55 times wider than long; distance between chitinous spots 2.4 times width at level of bottom of median sinus and 3.1 times dental line).

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 33.5: 30: 31: 33: 33: 32, the body being slender and with sides subparallel as in the older stages. Body in specimen described ten times longer than width of tenth plate.

Coxal pores very small or minute; 1, 2, 2, 2 or 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,1,1}$; of second to sixth inclusive, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of seventh, $\frac{0,0,0,2,2}{0,0,0,1,1}$; of eighth, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of ninth, $\frac{0,0,0,2,2}{0,0,1,2,1}$; of tenth and eleventh, $\frac{0,0,0,2,2}{0,0,1,1,1}$; of twelfth, $\frac{0,0,1,1,2}{0,0,1,2,1}$; of thirteenth, $\frac{0,0,2,1,1}{0,0,1,3,1}$; of penult, $\frac{0,0,2,1,1}{0,1,2,2,0}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last pair of coxae laterally armed.

Female gonopods short, the three articles present. Claw represented by a small, acute point. Second and third articles glabrous; first with one or two bristles. Spines 1 + 1, small and acute, pale.

Length of specimen described 6.5 mm.

Agenitalis II.— Color very dilute yellowish white. Head and prehensorial feet yellow. Antennae whitish or in some pale yellow proximally. Legs whitish, with tarsi pale yellowish; posterior pairs of legs pale yellow especially distally.

The twenty articles of antennae already present, the ultimate being very long, the others decreasing from the second distad. Bristles relatively long, not dense.

Ocelli 1 + 2, small.

Prosternal teeth 2 + 2, the line of apices straight or even slightly procurved, the inner one being the larger. Spine pale, stouter at base as usual and drawn out apically in bristle-like form, straight, very close to the tooth. (Prosternum 1.5 times wider than long; distance between chitinous spots 2.87 times greater than width at level of bottom of sinus; 3.28 times the dental line).

Coxal pores minute, 1, 2, 2, 2 — 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,1,1}$ or $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the second to fifth $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the eighth, $\frac{0,0,0,1,1}{0,0,0,1,1}$ (anterior); of the ninth, $\frac{0,0,0,1,1}{0,0,0,1,1}$ or $\frac{0,0,0,1,2}{0,0,0,1,1}$; of the tenth, $\frac{0,0,0,1,2}{0,0,0,1,1}$ or $\frac{0,0,0,2,2}{0,0,0,1,1}$; of the eleventh, $\frac{0,0,0,1,2}{0,0,0,1,1}$ or $\frac{0,0,0,0,2}{0,0,0,1,1}$; of the twelfth, $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the thirteenth, $\frac{0,0,1,1,1}{0,0,1,1,1}$ or $\frac{0,0,2,1,1}{0,0,1,1,1}$; of the penult, $\frac{0,0,1,0,0}{0,1,2,1,0}$ or $\frac{0,0,2,0,0}{0,1,2,1,0}$; of the anal, $\frac{0,0,2,0,0}{0,1,3,1,0}$ or $\frac{0,0,3,0,0}{0,1,3,1,0}$. None of the coxae armed.

Anal glands absent or in some still evident.

Length 5 to 6 mm.

Agenitalis I.— Color much as in the preceding stage.

Articles of antennae eighteen, all excepting ultimate and the first two or three very short. Bristles long, not dense.

Ocelli pale; 1 + 2.

Prosternum as described for *agenitalis* II.

Width of head and of first, third, eighth, tenth, and twelfth plates to each other as 29: 24: 24.5: 25: 25: 23, the head being proportionately much larger than in older stages.

Coxal pores minute; 1, 1, 1, 1.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,0,1}$ to $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the second to eleventh, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the twelfth, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the thirteenth, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the penult and anal, $\frac{0,0,0,0,0}{0,0,0,1,1,0}$. None of the coxae armed.

Anal glands present, well developed, pale; the common median opening slit-like.

Length 4–5 mm.

Pullus III (*Larva tertia*).— Body, legs, and antennae whitish or already slightly yellowish. Head pale yellow.

Head in comparison with dorsal plates much wider than in the *maturus* and intermediate stages.

Antennae very short; composed of fourteen articles of which the first three and the ultimate are longest, the others being very short.

Ocelli but one on each side, this small and often indistinct.

Prosternum as in *agenitalis* stages.

Coxal pores restricted to one on each coxa of the twelfth pair of legs.

Only ten pairs of developed legs present, those of the eleventh and twelfth pairs being present as slender buds in which the coxa is already distinctly set off. Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,0,0}$ or $\frac{0,0,0,0,1}{0,0,0,0,0}$; of the second, $\frac{0,0,0,0,1}{0,0,0,0,0}$ or $\frac{0,0,0,0,1}{0,0,0,0,1}$; of the third, $\frac{0,0,0,0,1}{0,0,0,0,1}$ or $\frac{0,0,0,0,1}{0,0,0,0,1,1}$; of the fourth to eighth, $\frac{0,0,0,0,1}{0,0,0,0,1,1}$; of the ninth and tenth, $\frac{0,0,0,0,0}{0,0,0,0,1,1}$.

Anal glands present but less well developed than in immediately succeeding stages.

Length near 3.5 mm.

Type.— M. C. Z., No. 318, California: Capitola. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 316, 317, California: Berkeley; M. C. Z., No. 384, Sausalito; M. C. Z., No. 381, Santa Cruz; M. C. Z., No. 382, Brookdale; M. C. Z., No. 383, Felton; Big Trees; M. C. Z., No. 385, Capitola. R. V. Chamberlin.

Also taken at Mill Valley, California. R. V. Chamberlin.

Oabius fratris, sp. nov.

Plate 1, fig. 8; Plate 2, fig. 10.

Diagnosis.— Moderately slender, with head clearly narrower than tenth plate. Dorsum from pale to dark brown, often olivaceous; head dusky caudad of suture. Ocelli in two series, rarely in one, five or six in number; caudal ocellus usually smaller than second. Prosternum 1.5 times wider than long; distance between chitinous spots 4+ times dental line; sinus v-shaped, widely open. Lateral lobes of female genital claw much narrower than median, a little shorter; basal spines moderate, apical portion abruptly acuminate. Coxal pores 2, 3, 3, 3–3, 4, 4, 3. Anal leg with claw single; third joint of all legs armed dorsally and ventrally, the ventral spines of twelfth and thirteenth normally two. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 1; of twelfth, dorsal, 1, 0, 3, 1, 2; of first, ventral, 0, 0, 1, 2, 1. Length, 7.5–8.6 mm.

Description.— Pale brown of dilute olivaceous tinge to dark brown. Head dusky caudad of the suture, tending toward dull orange in the frontal region in specimens in full color; first dorsal plate often darker along with head. Antennae brown or orange-brown, usually somewhat paler distally. Prosternum dusky testaceous, the prehensorial feet clearer. Venter pale, suffused with purplish over the anterior

half or more, the last few plates darker. Posterior legs more brightly colored, yellow, as usual.

Body moderate, mostly 8 times longer than width of tenth plate or a little less. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other about as 51:50:51:59:60:59; the body thus considerably narrowing cephalad with the first plate a little narrower than the third.

Head equal in length and breadth.

Antennae short; articles moderate or short, decreasing in length distad in usual way, each somewhat clavately widening from its proximal end. Ultimate article typically slightly longer than the two preceding together.

Each eye (Plate 1, fig. 8) consisting of mostly five or six ocelli arranged in two series or in one very irregular one: *e. g.*, 1 + 2, 2; 1 + 3, 2; 1 + 4. Single or most caudal ocellus mostly smaller than one or more of the others.

Prosternum near 1.48 times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of sinus; 4.1 times the dental line. Median sinus widely open, v-shaped. Spine in usual position and of usual form. Teeth small, equal; line of apices slightly recurved.

First dorsal plate only moderately and gradually narrowed caudad; 1.7 times wider than long. Caudal corners of ninth, eleventh, and thirteenth dorsal plates straight, or those of the first two may be rounded.

Coxal pores 2, 3, 3, 3 –3, 4, 4, 3.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,1,2,2}{0,0,1,3,1}$; of the third and fourth, $\frac{0,0,1,2,2}{0,0,1,3,2}$; of the fifth to eighth inclusive, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the ninth, tenth, and eleventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed.

Claw of female gonopods short and relatively wide, well curved; tripartite with the median lobe not much extending distad of the lateral, but much wider than these. Basal spines of medium length, gradually narrowing from base distad to the more abruptly acuminate distal portion, the apex of which is narrowly rounded (Plate 2, fig. 10).

Length 7.5 to 8.6 mm.

Pseudomaturus (Early).— Dilute brown, with the last two plates darker, as also may be two or three anterior ones along their caudal

borders. Head brown, with antennae similar excepting at tips which are lighter. Posterior legs bright yellow, the others very pale.

Antennae as in *maturus* proper or articles a little shorter.

Ocelli 1 + 2, 1; somewhat angular.

Prosternum as in *maturus*.

Coxal pores 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,2,1}$ or $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,1,2,1}{0,0,1,2,1}$ or $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the third to fifth inclusive, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the sixth to eighth, $\frac{0,0,1,2,2}{0,0,1,3,2}$; of the ninth, $\frac{0,0,2,2,2}{0,0,2,2,2}$ or $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the remaining pairs as in the *maturus* proper.

Claw of female gonopods more slender and paler than in the adult, with the teeth more acute. Spines as in adult, but mesal ones proportionately shorter, about three fourths the length of the ectal ones.

Length about 6.75 mm.

Praematurus (♂).— Head light yellow, with the antennae a paler yellow. Rest of body pale, almost unpigmented. Posterior legs white, of yellowish cast.

Antennae essentially as in older stages.

Ocelli 1 + 2, 1, smaller and paler than in the *pseudomaturus*.

Prosternum as in *maturus*.

Coxal pores, 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the second, $\frac{0,0,0,2,2}{0,0,0,1,1}$; of the third to seventh inclusive, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the eighth, $\frac{0,0,1,2,2}{0,0,0,2,1}$; of the ninth to eleventh, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the twelfth, $\frac{1,0,2,1,2}{0,0,2,3,1}$; of the thirteenth, $\frac{1,0,2,1,1}{0,0,2,3,1}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last two pairs of coxae already laterally armed.

Gonopods of male distinct; each bearing one bristle.

Type.— M. C. Z., No. 313, California: Friant, March, 1913. R. V. and S. C. Chamberlin.

Paratypes.— M. C. Z., No. 314, 315, California: Friant, March, 1913. R. V. and S. C. Chamberlin.

Oabius tiganus (Chamberlin).

Plate **1**, fig. 7; Plate **2**, fig. 5.

Lithobius utahensis var. *tiganus* Chamberlin, Pomona college journ. ent., 1910, **2**, p. 374.

Diagnosis.— Slender; first dorsal plate as wide as third; head equal in length and breadth. Yellow, caudal plates and head with

first plate orange. Ocelli about six in two series. Prosternum between 1.5 and 1.6 times wider than long; distance between chitinous spots $3\frac{2}{3}$ times dental line; sinus v-shaped. Lobes of genital forceps short, blunt; basal spines long, subequal. Coxal pores 2, 4, 4, 3 to 3, 4, 4, 3. Claw of anal leg single. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 2; of twelfth, dorsal, 1, 0, 3, 1, 1; of first, ventral, 0, 0, 1, 3, 1. Length 8 to 11 mm.

Description.— Dorsum yellow. Head, caudal plates and commonly also the first dorsal plate, light orange, with the frontal region lighter, yellowish. Antennae yellow to brown. Prosternum pale orange to subferruginous with the prehensorial feet lighter. Venter dilute yellow, the posterior plates orange. Legs nearly like venter, the posterior pairs thus more deeply pigmented, light orange to bright yellow at least distally.

Body of moderate slenderness, 8.5 or sometimes less, times longer than width of tenth plate.

Head as long as wide or nearly so; subcordate; caudal margin slightly excurved; considerably narrowed cephalad. Two sulci diverging cephalad on caudal portion. Smooth.

Antennae very short, reaching only to the fourth or sometimes fifth segment. Articles short, from a little clavate to subcylindric, the sides straight. Bristles long.

Each eye (Plate 1, fig. 7) consisting mostly of six or seven ocelli arranged in two series: *e. g.*, 1 + 2, 3; 1 + 3, 2; 1 + 3, 3. Ocelli all of about same size black, the series somewhat oblique.

Prosternum 1.57 times wider than long. Distance between chitinous spots twice the width at level of bottom of sinus; 3.66 + times as long as the dental line. Teeth small, dark tipped; line of apices a little recurved. Spine slender, straight. Median sinus v-shaped.

First dorsal plate with sides considerably convex; widest a little cephalad of middle. 1.86 times wider than long in average specimen. Minor plates all with margins straight, the corners in part rounded or obliquely excised. Plates smooth and shining or posterior ones but weakly roughened.

Coxal pores small, 3, 4, 4, 3; 2, 4, 4, 3; 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 1}$; of the second to sixth pairs inclusive, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$; of the seventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 3,\ 2}$ or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the eighth to eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$ or rarely, in *pseudomaturus*, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$. Last two pairs of coxae laterally armed.

Anal and penult legs moderately and uniformly thickened; faintly longitudinally sulcate dorsally.

Claw of female gonopods rather broad relatively; moderately curved. Tripartite, the lobes blunt, the median but slightly longer than the dorsal, than which the ventral is a little smaller and more proximad. Spines long and differing slightly in length, more or less converging from base to acuminate distal portion the apex of which is narrowly rounded (Plate **2**, fig. 5). Median process of preceding sternite distally truncate. Distal article with mostly two bristles visible in ventral view; second with four; and the first with ten or twelve.

Length 8 to 11 mm. A female (type) 10 mm. long has antennae and anal legs 3 mm. long, and tenth dorsal plate 1.17 mm. wide.

TYPE.— M. C. Z., No. 393, California: Pacific Grove. R. V. Chamberlin.

PARATYPES.— M. C. Z., No. 319, 391, 392, California: Pacific Grove. R. V. Chamberlin.

Also taken in California at Santa Barbara (M. C. Z., No. 320, 390); Berkeley (M. C. Z., No. 321); Santa Cruz (M. C. Z., No. 389), and Monterey. R. V. Chamberlin.

OABIUS PATONIUS (Chamberlin).

Plate **1**, fig. 1–4.

Lithobius patonius Chamberlin, Can. ent., 1911, **43**, p. 381.

DIAGNOSIS.— Slender to very slender; first dorsal plate much narrower than third and head than tenth. Brown, the head more reddish. Ocelli four to seven, in one or two series; caudal ocellus not enlarged. Prosternum between 1.5 and 1.6 times wider than long; distance between chitinous spots 3.25 times dental line; sinus narrowly rounded at bottom. Lobes of female genital claw short, lateral ones small; outer basal spine considerably longer than inner. Coxal pores 2, 3, 3, 2–2, 3, 3, 3. Claw of anal leg single. Third joint of legs from third to near tenth pair unarmed either dorsally or ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 1; of twelfth, dorsal, 0, 0, 2, 1, 2; of first, ventral, 0, 0, 0, 1, 1. Length 5–7.5 mm.

DESCRIPTION.— Dorsum brown, typically dark. Head more reddish than dorsum and lighter, especially in front of suture. An-

tennae brown proximally, pale brown or yellowish distally. Venter brown, usually of paler cast than dorsum, with the last plates darkest and often very deep in color. Legs greyish brown, the ultimate pairs bright yellow excepting proximally.

Body slender, being from 8.5 to 9.5 times longer than the width of the tenth dorsal plate. The males seem to average smaller and to be proportionately a little wider than the females. First plate always distinctly narrower than the third and than the head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other. about as 46 : 42 : 45 : 52 : 54 : 52 (♀) or 35 : 32 : 34 : 38 : 39 : 38 (♂).

Head slightly longer than wide (35 : 34). Caudal margin straight. Sides between eyes and lateral breaks only slightly curved. Sides back of breaks moderately converging.

Antennae short. Articles mostly very short, decreasing from the second distad. Hairs not dense.

Ocelli on each side from four to seven in number. Arranged in two series, with in most cases fewer in the upper than in the lower: *e. g.*, 1 + 1, 4, which is the commonest arrangement; 1 + 1, 3; 1 + 2, 4; 1 + 2, 5; 1 + 3; 1 + 4; 1 + 2, 2; 1 + 3, 2. When there is but one ocellus in the upper series, this may be larger than any other. Ocelli mostly separated, well pigmented. Single ocellus not enlarged.

Prosternum (Plate 1, fig. 3) in an average individual 1.56 times wider than long. Distance between chitinous spots 2, or slightly more, times greater than width at level of bottom of sinus; 3.25 times the dental line. Teeth broad proximally, sides straight and apices angular; line of apices recurved. Sides of sinus straight and converging at an acute angle but sinus narrowly rounded at bottom. Spine considerably stouter at base than bristles, but hair-like distally; curving mesad over tooth.

Sides of first dorsal plate evenly rounding from about caudal corners to middle, moderately diverging, while in the anterior portion they are subparallel or at anterior end slightly bending mesad; 1.7 times wider than long. Minor plates with corners subrectangular or evenly rounded, more straight on caudal side, none with corners obliquely excised.

Coxal pores mostly 2, 3, 3, 2 or 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of second, $\frac{0,0,1,2,1}{0,0,0,1,1}$ or $\frac{0,0,1,2,2}{0,0,0,1,1}$; of the third, $\frac{0,0,1,2,2}{0,0,0,1,1}$; of the fourth, $\frac{0,0,0,2,2}{0,0,0,1,1}$; of the fifth to ninth, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the tenth, $\frac{0,0,0,2,2}{0,0,0,2,1}$ or $\frac{0,0,0,2,2}{0,0,1,2,1}$; of the eleventh, $\frac{0,0,0,2,2}{0,0,1,2,1}$ or $\frac{0,0,0,2,2}{0,0,2,2,1}$; of the twelfth, $\frac{0,0,2,1,2}{0,0,2,3,1}$; of the thirteenth, $\frac{1,0,2,1,1}{0,0,2,3,1}$ or $\frac{1,0,2,1,1}{0,0,2,3,2}$; of

the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed or occasionally only the anal pair.[1]

Gonopods of male small and rounded, wart-like, bearing but a single bristle.

Claw of female gonopods short and proportionately wide, well curved, concave. Tripartite, with the lateral teeth small, sometimes only weakly differentiated. Outer basal spine of each pair uniformly considerably larger than the inner one, attenuated from base to distal end where the sides round in somewhat to apex. Articles glabrous on dorsal side or nearly so.

Length from 5 to 7.5 mm. A female 7 mm. long has antennae 1.7 mm. long, anal leg 2 mm. long, and tenth plate .73 mm. wide. The maximum male observed is 6.5 mm. long, the females appearing to average larger and ranging to 7.5 mm. in length.

TYPE.— M. C. Z., No. 324, California: Mill Valley. R. V. Chamberlin.

PARATYPES.— M. C. Z., No. 401, California: Berkeley; M. C. Z., No. 402, Mill Valley. R. V. Chamberlin.

Also taken in California at Pacific Grove (M. C. Z., No. 398); Santa Barbara (M. C. Z., No. 399); Brookdale (M. C. Z., No. 400); Felton Big Trees, and Sausalito. R. V. Chamberlin.

OABIUS PATONIUS FLAVUS, var. nov.

Plate 1, fig. 5; Plate 2, fig. 7.

DESCRIPTION.— Pale yellowish, caudal plates sometimes a little darker, varying to dilute orange. Head and prosternum bright yellow or orange, clearer in frontal region. Antennae yellow. Legs pale and essentially unpigmented excepting the posterior pairs which, as usual, are brighter.

Head little longer than wide.

Antennae short; articles short but not closely compacted, irregularly decreasing in size distad. Ultimate article almost equal in length to the two preceding together.

Ocelli pale; four to six in number; arranged in mostly two series with more in the upper than in the lower one: *e. g.*, 1 + 3, 2, the most

[1] The spine of the third joint of the first three pairs of legs is on the caudal side and may appear at first rather ventral than dorsal but its size and precise position show it to belong really to the dorsal set.

common arrangement; 1 + 2, 3; and 1 + 3; the patch not elongate. Single ocellus sometimes a little largest, in other cases smaller than the caudal one of series.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 1, 1, 1}$; of the second, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 1}$; of the third, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 1}$; of the fourth, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 1, 1}$; of the fifth to ninth, $\frac{0, 0, 0, 2, 2}{0, 0, 0, 2, 1}$; of the tenth, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 1, 3, 1}$; of the eleventh, $\frac{0, 0, 1, 2, 2}{0, 0, 2, 3, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 2, 2, 1}$; of the twelfth, $\frac{0, 0, 2, 1, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 2, 1, 1}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$. Last pair of coxae laterally armed.

Gonopods of female as in the species proper or very nearly so. Basal spines of type (Plate **2**, fig. 7).

Length 6.5–7 mm.

Type.— M. C. Z., No. 395, California: Santa Barbara. R. V. Chamberlin.

Paratype.— M. C. Z., No. 327, California: Santa Barbara. R. V. Chamberlin.

It may prove inadvisable to maintain this form as a separate variety when more material has been examined; but the specimens studied are sufficiently divergent in ocelli, spining of legs, etc. to warrant tentative separation.

Oabius patonius micrus, var. nov.

Plate **1**, fig. 10; Plate **2**, fig. 6.

Description.— Dorsum chestnut, more brownish near middle. Head dusky behind suture, the frontal region clearer, dark orange. Legs light brown, the posterior pairs more brightly pigmented, yellowish orange except proximally. Venter dusky brown, not at all reddish, most caudal plates darker as usual. Prosternum much darker than venter. Antennae distally orange, proximally dark brown.

Body proportionately rather broad, being typically between 7.5 and 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 45 : 42 : 44 : 51 : 53 : 51.

Head longer than wide (47 : 45): cordate.

Antennae very short. Articles short and very short decreasing distad as usual. Ultimate article a little longer than the two preceding together.

Ocelli as in species: 1 + 4; 1 + 1,4; 1 + 1,3. All ocelli con-

tiguous, the first ocellus of series proper distinctly largest, the single ocellus of same size as more anterior ones.

Prosternum (Plate 1, fig. 10) near 1.43 times wider than long. Distance between chitinous spots 2.3 times width at level of bottom of mesal incision; 3.7 times dental line. Spine as usual. Teeth small and pale, rather obtuse; line of apices distinctly recurved. Sinus v-shaped, narrowly rounded at bottom.

Posterior angles of thirteenth plate slightly extended but well rounded; posterior angles of ninth strongly obliquely excised. First dorsal plate nearly as wide at middle as at anterior end; 1.65 times wider than long.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,2,1}$ or $\frac{0,0,1,1,1}{0,0,0,2,1}$; of the second, $\frac{0,0,1,2,2}{0,0,0,2,1}$; of the fourth to tenth, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the eleventh, $\frac{0,0,0,2,2}{0,0,1,3,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,3,2}$ or $\frac{0,0,1,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{0,0,2,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$ (in one regenerated leg $\frac{1,0,3,1,0}{0,1,3,2,0}$); of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Anal coxae laterally armed.

Claw of female gonopods nearly as in typical form of species. Basal spines (Plate 2, fig. 6).

Length 7 to 8 mm.

Type.— M. C. Z., No. 397, California: Pacific Grove. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 325, 326, California: Pacific Grove; M. C. Z., No. 396, Capitola. R. V. Chamberlin.

The types represent a form averaging larger and considerably more robust than typical *O. patonius*. Among the differences presented by the variety, the presence of two ventral spines on the fourth joint of the first four pairs of legs, with the dorsal spines of the twelfth legs reduced to 0, 0, 2, 1, 1 or even 0, 0, 1, 1, 1 while its ventral ones stand as 0, 0, 2, 3, 2, should be especially noted.

Oabius uleorus, sp. nov.

Plate 2, fig. 9.

Diagnosis.— Stout; the head distinctly wider than long; first dorsal plate narrower than third. Light brown or testaceous, head obscure orange. Ocelli nine to eleven in three series; single ocellus not enlarged. Prosternum 1.5 + times wider than long; distance between chitinous spots four times dental line; sinus v-shaped. Lobes

of genital forceps acute, lateral smaller; basal spines stout, moderate in length, inner considerably the shorter. Coxal pores 3, 4, 4, 4. Claw of anal leg single. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 2; of twelfth, dorsal, 1, 0, 3, 1, 1; of first, ventral, 0, 0, 1, 2, 1. Length 8 to 10 mm.

Description.— Light brown or testaceous, the first plate and the caudal margins of several succeeding ones darker; the caudal plates more reddish. Head obscure orange, darker caudad of suture. Antennae testaceous, brighter at tips. Prosternum and prehensorial feet testaceous. Venter very pale excepting the fourteenth and fifteenth plates which are testaceous. Last two pairs of legs bright yellow, of duller hue proximally. Other legs very pale.

Body proportionately wide, in type 7.5 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 58 : 54 : 56 : 67 : 69 : 66, the body being thus distinctly narrowed cephalad with first plate narrower than third and than head.

Head wider than long in ratio 58 : 56 or 55. Widest near lateral interruptions, nearly uniform in width from there to eyes.

Antennae short. Articles toward distal end becoming very short and closely compacted. Ultimate article considerably longer than the two preceding together, ordinarily exceeding them by about one half the length of the third preceding one.

Ocelli mostly nine to eleven in number, arranged in three series: *e. g.*, 1 + 5, 3, 1; 1 + 3, 4, 2; 1 + 3, 4, 3; 1 + 4, 3, 1; 1 + 4, 3, 2. Single ocellus not large. Seriate ocelli compactly arranged, deeply pigmented.

Prosternum 1.55 + times wider than long. Distance between chitinous spots 2.3 times width at sinus; 4 times length of dental line. Teeth acute, equal; interval between those of each pair somewhat angular; line of apices nearly straight. Sinus v-shaped, with sides slightly concave. Spines of usual form.

First dorsal plate widest a little back of the anterior end, moderately narrowed caudad; caudal margin incurved mesally; plate as a whole about 1.75 times wider than long. Ninth and eleventh plates with corners oblique; those of the thirteenth straight.

Coxal pores small, decreasing proximad; 3, 4, 4, 4.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$; of the third to seventh inclusive, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the

ninth and tenth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{1,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$; claw one. Last two pairs of coxae laterally armed.

Claw of female gonopods short and well curved; rather narrow; tripartite, with teeth acute and the lateral ones smaller and a little proximad of the median. Basal spines of moderate length, stout, in ventral view parallel sided from base to the short but angularly acuminate distal division (Plate **2**, fig. 9).

Length 8 to 10 mm. The female type in 9.6 mm. long and has antennae 3.3 mm. long, with tenth dorsal plate 1.27 mm. wide.

Type.— M. C. Z., No. 337, Alaska: Forrester Island, May–June, 1913. Harold and R. W. Heath.

Paratypes.— M. C. Z., No. 403, 404, Alaska: Forrester Island, May–June, 1913. Harold and R. W. Heath.

In general appearance and structure this species much suggests *O. tiganus*. It is a proportionately wider species. The females differ in the form of the claw of the gonopods and conspicuously in the form and proportion of the basal spines. (*Cf.* Plate **2**, fig. 5, 9).

Oabius dissimulans, sp. nov.

Plate **3**, fig. 1–3.

Diagnosis.— Slender; first plate clearly narrower than third and head than tenth. Testaceous to dark brown, head pale orange to ferruginous. Ocelli ten to thirteen in three series. Prosternum 1.45 to 1.48 times wider than long; distance between chitinous spots 4 ± times dental line; sinus narrowly v-shaped. Lobes of genital forceps small, median but slightly longest; basal spines short and broad. Coxal pores 3, 3, 3, 3 to 3, 4, 4 (5), 3. Claw of anal leg single. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 1; of twelfth, dorsal, 1 (0), 0, 3, 1, 1 or 1, 0, 2, 1, 1; of first, ventral, 0, 0, 1, 3, 1. Length 8 to 10.5 mm.

Description.— Dorsum from testaceous to rather dark brown, the first plate often and sometimes the first several plates darker than the others; some of the major plates commonly darkened along caudal borders. The head varies from pale orange in lighter individuals, to ferruginous and dark brown in the darker ones, the region caudad of suture dusky. Antennae brown, often of deep cast, at tips commonly

abruptly light. Prosternum pale orange to dilute ferruginous and brown, the prehensors paler. Venter yellowish to brown, usually dilute, with the caudal plates from light orange in paler specimens to a burnt brown in the darker ones. Legs bright yellow to light orange.

The body is in the typical form mostly from 7.75 to 8.5 times longer than width of tenth plate, but in some individuals may be even as much as 9 or 9.5 times longer. It is distinctly narrowed from tenth plate cephalad, with first plate a very little narrower than the third and than the head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other nearly as 31 : 30.5 : 31 : 35 : 36 : 34.5.

Head equal in length and breadth, or slightly longer than wide (*e. g.*, 47 : 46) as usual, occasionally even slightly wider than long. Bristles rather long, sparse. Not punctate or furrowed. Of usual form.

Antennae short, reaching to the fifth segment; strongly attenuated distad. Articles short and very short, decreasing distad as usual. Hairs long, not dense.

Each eye consisting mostly of from ten to thirteen ocelli arranged in three or in two series: *e. g.*, 1 + 5, 4, 3; 1 + 5, 3, 2; 1 + 4, 3, 2; 1 + 5, 3, 3; 1 + 3, 4, 3; 1 + 4, 3; 1 + 5, 3; 1 + 4, 2. Single ocellus distinctly largest, subelliptic. Seriate ocelli, excepting caudal one or more of uppermost series, mostly small.

Prosternum mostly from 1.45 + to 1.48 times wider than long. Distance between chitinous spots 2.5 times the width at level of bottom of sinus; $3\frac{1}{3}$ times width at level of bottom of interval between teeth of each pair (which is nearly as deep as bottom of sinus in most related species); and 3.8 to 4 + times the dental line, mostly near the latter ratio. Lateral edge of anterior portion of prosternum straight, and almost in line with outer side of ectal tooth. Sinus very narrowly v-shaped and considerably deeper than usual, the sides straight and at bottom meeting in a narrowly acute angle.

First dorsal plate mostly 1.7 to 1.8 times wider than long; sides evenly convex, diverging moderately cephalad, widest a little caudad of anterior end. Posterior minor plates typically with the caudal corners obliquely excised, with the line of truncature rather long. Posterior plates sometimes obscurely finely roughened. Hairs short and sparse, less sparse caudad. Sternites clothed with short hairs which become more numerous on the caudal ones; the last or pregenital sternite subdensely clothed with hairs which are mostly longer.

Coxal pores circular, small; on each coxa decreasing rather regularly proximad. Examples of number and arrangement are: 3, 4, 4, 3, the most common; 3, 4, 5, 3; 3, 3, 3, 3; 3, 3, 4, 3.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the second to seventh, $\frac{0,0,2,2,2}{0,0,1,3,2}$ or the second rarely $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the eighth, $\frac{0,0,2,2,2}{0,0,1,3,2}$ or $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the ninth and tenth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,2,1,2}{0,0,2,3,2}$, of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$, $\frac{1,0,2,1,1}{0,0,3,3,2}$ and $\frac{0,0,3,1,1}{0,0,2,3,2}$ or $\frac{1,0,3,1,1}{0,0,2,3,2}$, with trochanter sometimes armed on one side, making ventral spines 0, 1, 3, 3, 2; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,2,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,1,2,3,2}$; of the fourteenth, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,1}{0,1,3,2,0}$; claw one. Last two pairs of coxae laterally armed.

Posterior legs in both male and female short and uniformly and but little thickened, being comparatively slender.

Gonopods of male small and pale; distally somewhat rounded to obliquely truncate; bearing two, or occasionally three, bristles.

Claw of female gonopods moderate in size and curvature; tripartite, the teeth rather small and nearly equal, the median one being but little largest. Spines comparatively short and broad, with the sides subparallel or even a little diverging from base to apical portion which is rather obtuse, with mostly one or more denticles at base on each side (Plate 3, fig. 1–3). Median process of sternite short, distally very obtusely angular.

Length from 8 to 10 mm. A female 16 mm. long has antennae 3 mm. and anal legs 3.75 mm. long with tenth plate 1.3 mm. wide.

Pseudomaturus.— Coloration mostly as in the paler individuals of *maturus*.

Proportion of body as in *maturus*.

Ocelli 1 + 4, 3, 2; 1 + 3, 3, 3; 1 + 4, 3, 1; 1 + 3, 3, 2.

Prosternum as in adult; sinus of same characteristic form; teeth a little paler.

Coxal pores as in adult excepting for mostly smaller size: in number, *e. g.*, 3, 3, 3, 3 and 3, 4, 4, 3.

Gonopods of female with claw relatively smaller and paler. Inner basal spine relatively somewhat shorter than in adult and also more slender.

Spines of legs as in *maturus*.

Length 7 to 8 mm.

Immaturus.— Color very dilute, somewhat whitish yellow, the pigment denser toward ends, with violaceous tinge in life. Head yellow of a dilute orange tinge, darker caudad of suture. Antennae yellowish, paler proximally and at very tip than in intermediate portion. Prosternum dilute orange, like the head. Venter whitish, a yellowish tinge evident on caudal plates. Legs very pale, greyish white, with the caudal pairs brighter.

Antennae very short; articles nineteen or twenty, those of distal half especially very short and closely crowded, being proportionately much shorter than in the adult.

Ocelli 1 + 3, 2; small and separated; single ocellus largest.

Prosternum 1.45 + times wider than long; distance between chitinous spots 2.5 times width at sinus, $3\frac{1}{3}$ times dental line. Sinus rather more widely open than in older stages.

First dorsal plate only 1.7 times wider than long. Widths of head and usual series of plates to each other as 33 : 29 : 30.5 : 34 : 33 : 32, the head thus proportionately larger than in *maturus*.

Coxal pores very small; 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the second and third, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the fourth to sixth, $\frac{0,0,0,2,1}{0,0,0,1,1}$; of the seventh, $\frac{0,0,0,2,2}{0,0,0,1,1}$; of the eighth, $\frac{0,0,1,2,2}{0,0,0,1,1}$; of the ninth and tenth, $\frac{0,0,2,2,2}{0,0,1,1,1}$; of the eleventh, $\frac{0,0,2,1,2}{0,0,1,1,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,2,1}$ or $\frac{0,0,2,1,1}{0,0,2,1,1}$; of the thirteenth, $\frac{0,0,2,1,1}{0,1,2,3,1}$ (the trochanter spine very small); of the penult, $\frac{1,0,2,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last pair of coxae laterally armed.

In the specimen described the gonopods of the female are short and pale with the three articles developed. The distal article is glabrous, while the first and second each bear a single bristle. Preceding sternite with one pair of longer bristles. Claw indicated merely as a minute pale point. Basal spines 1 + 1, minute, pale, and acute.

Length of specimen described, 5.7 mm.

Type.— M. C. Z., No. 380, California: Pacific Grove. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 322, 375, California: Brookdale; M. C. Z., No. 323, 373, Sausalito; M. C. Z., No. 369, Santa Cruz Island; M. C. Z., No. 370, 376, Pacific Grove; M. C. Z., No. 371, Felton Big Trees; M. C. Z., No. 372, Mill Valley; M. C. Z., No. 379, Berkeley. R. V. Chamberlin.

Also taken in California at Capitola and Santa Barbara.

This species is subject to considerable variation in slenderness. The typical specimens from Pacific Grove vary from 7.5 to 8 times longer than the width of the tenth plate; while those from Sausalito and Mill Valley seem on the average to be considerably more slender, from 9 to 9.5 times longer than width of that plate. The head, too, varies more than usual in its relative length and breadth. The spining, *e. g.* of the twelfth legs, likewise varies, as indicated above. It does not seem possible, however, clearly to establish any well-defined local varieties as intergrades are everywhere to be found. As

a species it is very distinct and easily separated from the others of the genus. The rather limited extent of variation in the form of the characteristic basal spines of the female gonopods may be judged from Plate 3, fig. 1–3, drawn from specimens from Brookdale, Santa Barbara, and Sausalito respectively.

Oabius sastianus (Chamberlin).

Lithobius sastianus Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 157. Pomona college journ. ent., 1910, **2**, p. 371, 374.

Diagnosis.— Moderate; first plate decidedly narrower than third, and the head than the tenth. Brown of somewhat reddish tinge, the posterior legs also brown. Ocelli near ten in three series. Prosternum $1\frac{2}{3}$ times wider than long; distance between chitinous spots 3.5 + times the dental line; sinus v-shaped. Median lobe of genital forceps longest; basal spines long and slender, outer longer. Coxal pores very small, 2, 2, 3, 3 to 3, 4, 4, 4. Claw of anal leg single. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 3, 1 or 0, 1, 3, 2, 1, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 2; of twelfth, dorsal, 0, 0, 3, 2, 2; of first ventral, 0, 0, 1, 2, 1 to 0, 0, 1, 3, 2. Length 8 to 10 mm.

Description.— Dorsum and head with antennae brown of somewhat reddish tinge; antennae pale distad as usual. Venter paler brown. Most legs yellowish, the posterior pairs brown.

Body moderate, in the types being from 7 (♀) to 8.5 (♂) times longer than width of the tenth plate. Moderately narrowed cephalad, with first plate of same width as tenth and narrower than head. Ratio of widths of head and of first, third, eighth, tenth, and twelfth plates near 49 : 45 : 45 : 53 : 53 : 52.

Head equal in length and breadth or very nearly so. Widest near marginal breaks, between which and the eyes the sides are nearly straight. Bristles few, long.

Antennae short, reaching the fifth segment. Composed of the usual twenty short and very short articles which decrease in length from the third distad.

Each eye composed of about ten ocelli which are arranged in three series: *e. g.*, 1 + 4, 3, 2. Ocelli decreasing in size from the dorsal row ventrad.

Prosternum $1\frac{2}{3}$ times wider than long. Distance between chitinous spots 2 times the width at level of bottom of sinus; 3.55+

times the dental line. Teeth small, the interval between those of each pair relatively wide, semicircular. Mesal incision v-shaped. Spine distally bristle-like as usual.

First dorsal plate nearly 1.8 times wider than long; conspicuously narrowing from anterior end caudad. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates straight or with a tendency to very slight extension, not at all excised.

Coxal pores very small: 2, 2, 3, 3; 2, 3, 3, 3; 3, 4, 4, 4.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,2,1}$ to $\frac{0,0,2,2,1}{0,0,1,3,2}$; of second, $\frac{0,0,1,2,2}{0,0,1,3,1}$ to $\frac{0,0,2,2,2}{0,0,1,3,2}$; of third to fifth, $\frac{0,0,2,2,2}{0,0,2,3,1}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of sixth to ninth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$, with one claw. Last two pairs of coxae laterally armed.

Anal and penult legs in both sexes moderately uniformly inflated.

Claw of female gonopods of moderate length, well curved; distinctly tripartite with the middle lobe somewhat longest as usual. Basal spines moderately long and slender; acuminate from base to apex, with the outer longer than the inner.

Length of types from 8 to 8.5 mm. A male 8.5 mm. long has antennae 2.8 mm. and anal leg 2.8 mm. long with width of tenth plate 1 mm. A female 8 mm. long has tenth plate 1.13 mm. wide.

Type.— M. C. Z., No. 336, California: Shasta Springs. R. V. Chamberlin.

A divergent species known only from the types, a single pair.

Oabius tabiphilus, sp. nov.

Plate 1, fig. 9; Plate 2, fig. 8.

Diagnosis.— Body moderate, first plate much narrower than third and head a little narrower than tenth. Dorsum dilute orange-yellow, head the same or a little deeper. Ocelli seven to eleven in two or three series. Prosternum 1.5 to 1.6 times wider than long; distance between chitinous spots 3.5 to 3.8 times the dental line; sinus narrowly v-shaped. Lobes of female genital forceps short and blunt, median but little longest; basal spines small. Coxal pores 3, 3, 3, 3–3, 4, 4, 3. Claw of anal leg single. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 0, 0; of penult, ventral, 0, 1, 3, 3, 1; of twelfth, dorsal,

1, 0, 3, 1, 2 or 1, 0, 3, 1, 1; of first legs, ventral, 0, 0, 1, 3, 1. Length 7–10 mm.

Description.— Dorsum dilute orange-yellow to light brownish yellow. Head like dorsum or with orange a little deeper; the frontal region pale. Antennae dilute orange-yellow, paler distad. Prosternum like head but more dilute. Venter pale yellowish, excepting the posterior plates which are light orange. Legs very pale or whitish yellow excepting the posterior pairs which are more densely pigmented, commonly bright lemon-yellow.

Body proportionately wide the length being from 7.25 to 8 times greater than width of the tenth dorsal plate. Body only moderately narrowed cephalad, the widths of head and of first, third, eighth, tenth, and twelfth dorsal plates being to each other about as 28 : 26 : 27.5 : 32 : 32 : 31.

Head usually slightly longer than wide (28 : 27). Of the usual form.

Antennae very short, reaching the fifth segment; moderately attenuated distad but tip not very slender. The twenty articles mostly very short and closely compacted, decreasing distad from the second or third.

Ocelli of each eye (Plate 1, fig. 9) from seven to eleven in number, arranged in two or three series: *e. g.*, 1 + 3, 3; 1 + 4, 4; 1 + 4, 3; 1 + 2, 3, 2; 1 + 4, 3, 2; 1 + 4, 4, 2. Single ocellus of about same size as most caudal one of upper series, or sometimes smaller and at others somewhat larger. Ocelli decreasing in size cephalad and ventrad, those of third series, when present, commonly very small.

Prosternum 1.5 to 1.6 times wider than long. Distance between chitinous spots 2.5 to 2.8 times width at bottom of sinus, 3.5 to 3.6 times as great as length of dental line. Teeth small, dark tipped. Sinus narrowly v-shaped, but sides a little concave. Spine nearly as in related species, stout at base and bristle-like distally; straight or nearly so.

First dorsal plate 1.73 to 1.75 times wider than long; caudal corners well rounded; sides moderately diverging cephalad. Eleventh and thirteenth plates with caudal margins straight or corners showing even a slight tendency toward extension, not at all excised.

Coxal pores small, circular, the most proximal often much smallest: 3, 4, 4, 3; 3, 3, 3, 3.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$; of the second to seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the eighth to tenth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the

twelfth, $\frac{1,0,3,\underline{1,2}}{0,0,3,\underline{3,2}}$ or $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,0,0}{0,1,3,2,0}$; claw one. Last two pairs of coxae laterally armed.

Anal and penult pairs of legs in both sexes short and rather slender, being but moderately uniformly thickened as in *O. tiganus*, etc., scarcely if at all more so in male than in female.

Gonopods of male considerably extended; pale; slender. In ventral view commonly appearing rounded apically but sometimes subtruncate. Bearing mostly two bristles.

Claw of female gonopods moderately bent and concave; tripartite with the teeth blunt and short, the median one being a little longest. Spines (Plate 2, fig. 8) small; broadest at base, the sides incurving and moderately converging to the acuminate distal division; apex rounded. Process of sternite distally truncate or slightly convex.

Length from 7 to 10 mm. A male 8.5 mm. long has antennae and anal legs both 3 mm. long, and the tenth plate 1.17 mm. wide.

Pseudomaturus.— Coloration as in *maturus*.

Antennae very short. Articles distad of second very short and closely compacted. Ultimate article in specimen described longer than the two preceding together and nearly equalling the three preceding.

Ocelli 1 + 4, 4. The first ocellus of dorsal series largest, the single one small. Ocelli somewhat irregular in form, size, and position.

Prosternum 1.4 times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of sinus; 3.8 times the length of dental line. Line of apices of teeth a little recurved.

Coxal pores 3, 3, 3, 2 – 3, 3, 4, 2.

Spines of first legs, $\frac{0,0,\underline{2},\underline{2},1}{0,0,1,2,1}$; of the second, $\frac{0,0,\underline{2},\underline{2},\underline{2}}{0,0,1,2,1}$; of the eighth, $\frac{0,0,\underline{2},\underline{2},\underline{2}}{0,0,1,3,2}$; of others as given for *maturus*.

Length of specimen described (a ♂) 6.5+ mm.

Praematurus (Late).— Color as in *maturus* or somewhat paler throughout.

Antennae as in *pseudomaturus*.

Ocelli 1 + 3, 2; 1 + 4, 3. First ocellus of dorsal series the largest.

Prosternum nearly as in *maturus;* teeth smaller and more acute. 1.47 times wider than long. Distance between chitinous spots $2\frac{1}{3}$ times width at level of bottom of sinus; 3.5 times dental line.

Coxal pores very small: 2, 3, 3, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,2,1}$; of the second, $\frac{0,0,1,2,1}{0,0,1,2,1}$ (left) or $\frac{0,0,1,2,1}{0,0,0,2,1}$ (right); of the third, $\frac{0,0,\underline{2},\underline{2},\underline{2}}{0,0,0,2,1}$ (left) or $\frac{0,0,\underline{2},\underline{2},\underline{2}}{0,0,1,2,1}$ (right); of the fourth

to eighth, $\frac{0,0,2,2,2}{0,0,0,2,1}$; of the ninth and tenth, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,0,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed.

Claw of female gonopods short and pale; the lateral teeth considerably the smaller. Inner spine about two thirds as long as the outer; both acuminate from base.

Length (♀) about 6.5 mm.

Immaturus.— Of a pale, slightly yellowish, tinge, the head and most caudal segments being of a denser yellow. Anal legs nearly white, darker proximad. Antennae pale yellow.

Antennae with articles rather more loosely joined than in the later stages, submoniliform.

Ocelli 1 + 3, 2. The single ocellus and the first two of the dorsal series largest and about equal in size; the others distinctly smaller; pale and well separated.

Prosternal teeth pale, in relative size and form as in *praematurus* or nearly so, 1.5 times wider than long. Distance between chitinous spots only 2.1 times width at bottom of sinus; 3 times length of dental line.

Coxal pores very small and pale margined; 2, 3, 3, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,2,1}$; of the second and third, $\frac{0,0,0,2,1}{0,0,0,2,1}$; of the fourth to seventh, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the eighth, $\frac{0,0,2,2,2}{0,0,0,2,1}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the tenth and eleventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,1,1}$; of the thirteenth, $\frac{0,0,3,1,1}{0,1,2,3,1}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,0,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed.

Female gonopods short and pale but distinctly triarticulate. Ultimate article with claw represented by a slight pale and acute spinule or tooth; without hairs. Second article apparently with a single short ventral bristle. First article with two ventral bristles. Spines 1 + 1, small and pale, acutely conical.

Length ad 6 mm.

Agenitalis II.— Pale, the yellowish tinge very dilute, clearer in head and prosternum and on caudal segments. Anal legs white with a tinge of yellow.

Articles of antennae distad of the second very short; the ultimate article proportionately longer than in older stages, being equal in length to the four preceding taken together, or very nearly so.

Ocelli 1 + 3. The two caudal ocelli of the series proper the largest,

irregular; the single one a little smaller and the most anterior one much smaller; middle ocellus of series a little lower than the other two. Organ of Tömösvary in outline larger than anyone of the ocelli.

Prosternum essentially as in later stages (specimen measured had prosternum 1.55 times wider than long; distance between chitinous spots 2.4 times width at sinus and 3.7 times the dental line).

Coxal pores, 1, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,0,1}$; of the second to sixth, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the seventh to ninth, $\frac{0,0,0,2,1}{0,0,0,1,1}$; of the tenth, $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the eleventh, $\frac{0,0,0,2,2}{0,0,1,1,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the thirteenth, $\frac{0,0,2,1,1}{0,1,1,1,1}$; of the penult, $\frac{0,0,2,1,0}{0,1,3,2,1}$; of the anal, $\frac{0,0,2,0,0}{0,1,3,2,0}$. None of coxae armed.

Gonopods of male appearing as slight, rounded, and wholly glabrous protuberances.

Gonopods of female appearing as much longer processes which are slender and conically pointed; biarticulate; glabrous; with no trace of claw or of basal spines.

In the male studied there is no longer any trace of anal glands; but in a female, the glands are traceable in an apparently degenerate condition.

Length of a female 5.3 mm.; of a male, 5.7 mm.

Types.— M. C. Z., No. 411, California: Santa Barbara. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 328–333, 407–410, California: Santa Barbara. R. V. Chamberlin.

Many specimens of this divergent and very distinct species were collected by the author in June, 1909, and in March, 1913. It is most easily detected through the uniform absence of any dorsal spine on the fourth joint of the anal legs.

Oabius (Nyctobius) decipiens, sp. nov.

Plate **3**, fig. 5.

Diagnosis.— Slender; first plate decidedly narrower than third; head wider than long, narrower than tenth plate. Testaceous to light chestnut; head brown to chestnut. Ocelli eight to ten in three series, the single ocellus distinctly largest. Prosternum less than 1.5 times wider than long; distance between chitinous spots 3.4— times dental line; sinus wide and shallow. Lobes of genital forceps short, median little longest; basal spines short and broad. Coxal pores

1, 2, 2, 2 to 3, 4, 4, 3, small. Anal leg with two claws. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 1; of thirteenth, ventral, 0, 1, 2, 3, 2 or, rarely 0, 1, 3, 3, 2; of twelfth, dorsal, 1, 0, 3, 1, 1; of first, ventral, 0, 0, 1, 2, 1. Length 8.5 to 10 mm.

Description.— Dorsum testaceous to light chestnut, with the first and the last plates darker than the median. Head brown to chestnut. Antennae nearly same color as head; paler at tips. Prosternum similar to head but somewhat paler. Venter pale testaceous to dilute brown, the caudal plates darker. Legs nearly same in color as the contiguous plates of venter, the posterior pairs being thus darker, but these paler along mesal and ventral surfaces, especially distad.

Body in types from 8.5 to 9 times longer than width of the tenth plate. Rather conspicuously narrowed cephalad, with the first plate much narrower than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other about as 27 : 25 : 28 : 32 : 33 : 30.

Head wider than long (27 : 26). Subrotund; the sides well rounded posteriorly; caudal margin mesally straight. On the caudal portion are two rather distinctly impressed furrows which diverge forwards.

Antennae short, reaching the fifth segment. Articles short, decreasing in size distad, the last ones being decidedly shorter than the proximal ones. Hairs moderately long.

Each eye consisting of from eight to ten ocelli arranged in two or three series: *e. g.*, 1 + 4, 4; 1 + 4, 3; 1 + 1, 4, 3; 1 + 3, 3, 1; 1 + 2, 4, 1. All ocelli rather large; the single one distinctly largest.

Prosternum 1.47 times wider than long. Distance between chitinous spots 2.2 times the width at level of bottom of sinus; 3.36 times the dental line. Teeth small and acute with sides more or less incurved; line of apices recurved. Sinus wide and rather shallow; sides and bottom rounded.

First dorsal plate $1\frac{2}{3}$ times wider than long; sides widely rounded behind, diverging moderately cephalad. Dorsum smooth and shining or but finely and obscurely roughened caudad.

Coxal pores small, decreasing proximad as usual. In number and arrangement, *e. g.*, 1, 2, 2, 2; 2, 2, 2, 2; 2, 3, 3, 2; 3, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 1, 1(2), 1}{0, 0, 1, 2, 1}$; of the second to seventh, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 1}$; of the eighth and ninth, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 2}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 2, 3, 2}$ or $\frac{1, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 2, 3, 2}$ or occasionally $\frac{1, 0, 3, 1, 1}{0, 1, 2, 3, 2}$; of the penult,

$\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$; claws two. Last two pairs of coxae laterally armed.

Anal and penult legs very short; slender; fourth and fifth articles weakly longitudinally furrowed dorsally.

Claw of female gonopods short and relatively wide; tripartite, with the lobes short, the median being not much longest. Spines wide and short, the sides parallel from base to the short acuminate distal portion; the latter subacute but with apex narrowly rounded (Plate **3**, fig. 5). Inner side of first article convex.

Length of types from 8.5 to 10 mm. A female 8.5 mm. long has antennae 2.8 mm. long and tenth dorsal plate 1 mm. wide.

Type.— M. C. Z., No. 405, California: Pacific Grove. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 334, California: Pacific Grove. R. V. Chamberlin.

Oabius (Nyctobius) ineptus, sp. nov.

Plate **2**, fig. 3, 4; Plate **3**, fig. 4.

Diagnosis.— Moderate; first plate narrower than third and head a little narrower than tenth. Dark brown, chestnut at ends, head and first tergite deeper chestnut. Ocelli six or seven in two series, the single ocellus clearly largest. Prosternum near 1.65 times wider than long; distance between chitinous spots 3.25+ times the dental line. Lobes of genital forceps short and rounded; basal spines short and broad, close together, outer spine but little longer than inner, not more robust. Coxal pores small, 1, 2, 2, 2–2, 2, 2, 2. Anal leg with two claws. Third joint of all legs armed dorsally and ventrally. Spines of anal legs, ventral, 0, 1, 3, 2, 0, dorsal, 1, 0, 3, 1, 0; of penult, ventral, 0, 1, 3, 3, 1; of thirteenth, ventral, 0, 1, 2, 3, 2; of twelfth, dorsal, 0, 0, 3, 1, 1; of first, ventral, 0, 0, 1, 2, 1. Length 7–7.3 mm.

Description.— Dark brown or chestnut, deeper chestnut anteriorly and posteriorly. Head and first dorsal plate deeper in color, appearing almost black caudad of the suture in front of which it is rather pale. Antennae chestnut, paler distally. Prosternum dark chestnut. Venter brown, the anterior and posterior plates darker and the latter especially more reddish. Legs brown.

Body 7.5 to 8 times longer than width of tenth plate; conspicuously narrowed cephalad to the first plate, with the head rather large. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other nearly as 25 : 23 : 25 : 27 : 27 : 27.

Head subrotund as in *O. decipiens*, the sides being conspicuously convex. Clearly wider than long, the ratio being near 25 : 23.

Antennae short as usual. Articles nineteen or twenty; decreasing in size distad as in other species.

In types, the ocelli are six or seven in number and are arranged in two series: *e. g.*, 1 + 3, 2; 1 + 3, 3. Single ocellus clearly largest though proportionately smaller than in *O. decipiens*. Other ocelli of moderate size.

Teeth of prosternum moderate; acute, with sides straight and intervals angular; inner tooth larger than the outer and the line of apices straight or nearly so. Prosternum 1.65 times wider than long. Distance between chitinous spots 2.1 times width at level of bottom of sinus; 3.26 times the dental line.

First dorsal plate with the sides between the rounded anterior and posterior portions nearly straight, moderately diverging cephalad; 1.9 times wider than long. Plates strongly arched, smooth and shining.

Coxal pores 1, 2, 2, 2 – 2, 2, 2, 2, small.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the second to seventh or thereabout, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the eighth and ninth, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,2,2}$ or $\frac{0,0,3,2,2}{0,0,2,2,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,2,2}$; of the twelfth, $\frac{0,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$; claws 2. Last two pairs of coxae laterally armed. Spining thus as in *O. decipiens*.

Anal and penult legs short; a little and uniformly thickened.

Claw of female gonopods (Plate **2**, fig. 3) relatively wide and short, moderately curved; tripartite with the lobes small and distally obtusely rounded, the median longest though not greatly so. Basal spines (Plate **2**, fig. 4; Plate **3**, fig. 4) of each side close together on a distinct low lobe or tubercle; broad, with the sides parallel or a little diverging from base to the acuminate apical portion which is subacute. Sternal process distally subacutely rounded.

Length of types 7 to 7.3 mm. A female 7.3 mm. long has antennae 2.6 mm. long and anal leg 2.8 mm. long, and the tenth dorsal plate .98 mm. wide.

Type.— M. C. Z., No. 335, Oregon; Portland, August, 1902. R. V. Chamberlin.

Paratype.— M. C. Z., No. 406, Oregon: Portland, August, 1902. R. V. Chamberlin.

The types consist of two specimens.

This species is very close in general structure to *O. decipiens*. These two species, aside from differing in size, in ocelli, in proportions of prosternum, and of first dorsal plate, etc., are at once to be separated by the differences in the basal spines of the female gonopods (Plate **3**, fig. 4, 5).

Kiberbius, gen. nov.

Head with the usual marginal interruptions.

Antennae short; composed normally of twenty articles.

Eyes composed of from one to three series of ocelli. Single ocellus but little enlarged.

Prosternal teeth 2 + 2; small; the dental line short with line of apices straight or a little recurved. Median sinus wide v-shaped.

Posterior angles of none of the dorsal plates produced.

Coxal pores small and circular, uniseriate.

Claw of female gonopods tripartite with the median not greatly exceeding the lateral. Basal spines long and slender; 2 + 2. Gonopods of male uniarticulate.

Tarsi of anterior legs with division typically indicated by difference in diameter, clear transverse line and partial suture (Plate **4**, fig. 6), but indication of division may be lacking (in *K. nannus* only).

Anal legs in both sexes conspicuously longitudinally furrowed along the mesal surface, the furrow broad and deep and the leg having a consequent thin or flattened appearance (Plate **5**, fig. 1). None of the coxae laterally armed. None of the legs cephalad of the twelfth having the third joint with three dorsal spines. Legs between the first or second and the twelfth pairs all with the fifth joint bearing two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 0 or 0, 1, 3, 1, 0 (in *K. nannus* only); claw single. Dorsal spines of penult legs, 1, 0, 3, 1, 1 or 1, 0, 2, 1, 1; ventral 0, 1, 3, 3, 1 to 0, 1, 2, 3, 0 (*K. nannus*); claws 3, the anterior one distinct, long, straight and spine-like. Dorsal spines of thirteenth legs, 1, 0, 3, 1, 1 or 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2 or 0, 0, 2, 3, 1. Dorsal spines of twelfth legs, 0, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2 or 0, 0, 1, 3, 2. Dorsal spines of eleventh, 0, 0, 2, 2, 2 or 0, 0, 0, 2, 2; ventral, 0, 0, 2, 3, 2 to 0, 0, 0, 3, 2. Dorsal spines of first legs, 0, 0, 1, 1, 1 or 0, 0, 1, 2, 1; ventral, 0, 0, 1, 1, 1 or 0, 0, 1, 2, 1.

Length under 9 mm.

Type.— *K. ogmopus*, sp. nov.

This genus, at present represented by three Californian species, is most readily distinguished by the presence in males and females alike of the conspicuous wide and deep longitudinal furrow along mesal surface of anal legs or by a pronounced corresponding flattening of the same. The genus is also separable through the absence of lateral spines from the posterior coxae.

Key to Species of Kiberbius.

a. Ventral spines of anal leg, 0, 1, 3, 1, 0; third joint of all or most legs between second and twelfth unarmed dorsally; length under 7 mm. ..... *K. nannus*, sp. nov.

aa. Ventral spines of anal legs, 0, 1, 3, 2, 0; third joint of all legs dorsally armed; length 8 mm. or more.

b. Head longer than wide, of nearly same width as tenth plate; first and third plates of same width or very nearly so. *K. remex* (Chamberlin)

bb. Head equal in length and breadth; head distinctly narrower than the tenth plate and the first plate than the third. *K. ogmopus*, sp. nov.

KIBERBIUS OGMOPUS, sp. nov.

Plate 4, fig. 5, 6; Plate 5, fig. 1–3.

DIAGNOSIS.— Body moderately stout; first dorsal plate 1.6 times wider than long, narrower than the third; head equal in length and breadth, narrower than tenth plate. Pale brown, first and last plates darker; head dark brown. Ocelli about ten in three series. Prosternum 1.5 + times wider than long; distance between chitinous spots 4.25 − times dental line. Lobes of genital forceps acute; basal spines long and slender, narrowing toward middle. Coxal pores 2, 2, 2, 2. Third joint of all legs dorsally armed. Spines of anal legs, ventral, 0, 1, 3, 2, 0; of penult legs, ventral, 0, 1, 3, 3, 1, dorsal, 1, 0, 3, 1, 1; of twelfth, ventral, 0, 0, 2, 3, 2; of first, ventral, 0, 0, 1, 2, 1, dorsal, 0, 0, 1, 1, 1. Length 8 to 9 mm.

DESCRIPTION.— Dorsum pale brown; the anterior plates darker and suffused with purplish; the posterior plates also darker. Antennae light purplish brown, paler at tips. Prosternum pale brownish. Venter very pale mesally, the anterior portion strongly suffused with

FIG. 2.— Distribution of Kiberbius.

purplish, the caudal ones distinctly darker. Anal and penult legs more or less suffused with purplish proximad of the tarsi.

Body typically from 7.5 to 8 times longer than width of tenth plate; conspicuously narrowed cephalad, the widths of head and of first, third, eighth, tenth, and twelfth plates in female type to each other as 47 : 42 : 49 : 55 : 55 : 52, the first plate thus conspicuously narrower than the third.

Head subcordate; caudal margin straight. Equal in length and breadth or a very little wider than long (Plate **4**, fig. 5).

Antennae moderately short. Articles of medium length; subcylindric; not closely compacted; those immediately preceding the ultimate short. Ultimate longer than the two preceding together.

Each eye consisting mostly of about ten ocelli arranged in three series: *e. g.*, 1 + 4, 3, 2. Ocelli of purplish cast. Single ocellus paler and a little largest. Those of most ventral row considerably smaller than the others. Organ of Tömösvary in outline about size of the smaller ocelli.

Prosternum (Plate **4**, fig. 6) 1.53 times wider than long. Distance between chitinous spots 2.57 times width at level of bottom of sinus; 4.23 times the dental line. Teeth acute with sides straight; line of apices only slightly recurved. Sides sloping directly from ectal tooth. Spine of usual type.

First dorsal plate only moderately narrowed caudad; caudal margin slightly mesally incurved; 1.6 times wider than long. Posterior corners of thirteenth dorsal plate straight; of the ninth and eleventh rounded or shortly obliquely truncate.

Coxal pores 2, 2, 2, 2.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 1, 2, 1}{0, 0, 1, 3, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 1, 3, 1}$; of the third to fifth, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 3, 1}$; of the sixth and seventh, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 3, 2}$; of the eighth, $\frac{0, 0, 1, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the ninth to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$.

Anal leg short. The tibia and the tarsal joints characteristically very deeply longitudinally furrowed or channelled along ventral surface, the femur less deeply so (Plate **5**, fig. 1). The penult leg has the tibia and tarsi similarly but much less conspicuously furrowed.

Claw of female gonopods short and proportionately wide; tripartite, the teeth and the incisions between them acute. Basal

spines relatively long and slender, the outer one in ventral aspect appearing narrowest near middle of length, the distal division short and acute; inner spine presenting edge ventrad and appearing in outline acutely acuminate from the very base (Plate 5, fig. 3).

Length mostly 8 to 9 mm.

Type.— M. C. Z., No. 339, California: Eaton's Canyon, near Altadena. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 419, California: Eaton's Canyon, near Altadena. R. V. Chamberlin.

The specific name of this species refers to the characteristic channelling of the anal legs.

Kiberbius nannus, sp. nov.

Plate 4, fig. 7; Plate 5, fig. 4.

Diagnosis.— Slender; first plate 1.6— times wider than long, much narrower than third; head longer than wide, narrower than tenth plate. Yellow, the head brightest. Ocelli four or five in one or two series. Prosternum 1.5— times wider than long; distance between chitinous spots four times the dental line; sinus v-shaped. Median lobe of genital forceps considerably longest; basal spines long and slender, inner nearly as long as outer. Coxal pores 1, 1, 1, 1. Third joint of all or most legs between second and twelfth unarmed dorsally or ventrally. Spines of anal legs, ventral, 0, 1, 3, 1, 0; of penult, ventral, 0, 1, 2, 3, 0, dorsal, 1, 0, 2, 1, 1; of twelfth, ventral, 0, 0, 1, 3, 2; of first, ventral, 0, 0, 1, 1, 1, dorsal, 0, 0, 1, 1, 1 or 0, 0, 1, 2, 1. Length 6 + mm.

Description.— Yellow. The head and posterior segments a brighter yellow. Antennae and posterior legs yellow.

Body between 8.5 and 9 times longer than width of tenth plate. Conspicuously narrowed cephalad. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 35 : 33 : 37: 43 : 44 : 42, the first plate thus being considerably narrower than the third.

Head (Plate 4, fig. 7) strongly narrowed cephalad of the eyes. Caudal margin straight. Considerably longer than wide (39 : 35).

Antennae short. Articles short and decreasing cephalad in the usual way. Ultimate article distinctly longer than the two preceding together.

Ocelli in type three or four in one or two series: *e. g.*, 1 + 3; 1 + 3.1. Single ocellus not specially enlarged.

Prosternum 1.48 times wider than long. Distance between chitinous spots 2.9 times width at level of bottom of median sinus; 4 times the dental line. Prosternal teeth small, the mesal one of each pair in the type somewhat larger than the outer and the line of apices thus straight or very slightly procurved. Sinus v-shaped with the sides a little convex.

First dorsal plate gradually narrowed caudad of the middle with posterior corners well rounded; caudal margin slightly incurved mesally. Plate as a whole 1.57 times wider than long.

Coxal pores 1, 1, 1, 1.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,1,1}$ or $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the second, $\frac{0,0,1,2,2}{0,0,1,1,1}$; of the third, $\frac{0,0,0,2,2}{0,0,1,1,1}$ or $\frac{0,0,0,2,2}{0,0,1,1,2}$; of the fourth, $\frac{0,0,0,2,2}{0,0,0,1,1}$; of the fifth to ninth, $\frac{0,0,0,2,2}{0,0,0,2,2}$; of the tenth and eleventh, $\frac{0,0,0,2,2}{0,0,0,3,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,3,2}$; of the thirteenth, $\frac{1,0,2,1,1}{0,0,2,3,1}$; of the penult, $\frac{1,0,2,1,1}{0,1,2,3,0}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,1,0}$.

Last three joints of the anal legs conspicuously longitudinally channelled along mesal side as in *K. ogmopus* but not quite so strongly so.

Claw of female gonopods scarcely curved, being nearly flat; tripartite, with the median lobe decidedly longest, the lateral ones at same level considerably proximad of distal one. Basal spines especially long and slender, the inner as long as or nearly as long as the outer; in ventral view the spines are narrowed gradually from base but the sides incurve midway between base and apical portion (Plate 5, fig. 4).

Length of female type, 6.2 mm.; width of tenth plate .7 mm.

Type.— M. C. Z., No. 340, California: Eaton's Canyon near Altadena, April, 1913. R. V. Chamberlin.

At first, it seemed likely that this form was to be identified with an immature stage of the preceding species because of certain apparently immature features, such as, to some extent, the spining of the legs. However, the gonopods are large and fully developed with no suggestion whatsoever of immaturity. Upon clearing and mounting the specimen showed well-developed eggs within the body.

Kiberbius remex (Chamberlin).

Lithobius remex Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 156; Pomona college journ. ent., 1910, **2**, p. 370, 374.

Diagnosis.— Body moderate; head longer than wide of nearly same width as tenth plate; first dorsal plate 1.8 times wider than long. Brown. Ocelli about six in two series. Prosternum 1.6 times wider than long. Coxal pores 3, 4, 4, 3. Third joint of all legs dorsally armed. Spines of anal legs, ventral, 0, 1, 3, 2, 0; of the first, ventral, 0, 0, 1, 2, 1. Length 8 mm.

Description.— Head and dorsum brown. Legs pale brown.

Body slightly less than 8 times longer than width of tenth plate. Body nearly parallel sided, the head and the tenth plate of same width. Widths of head and of first, third, eighth, and tenth plates to each other as 28 : 26 : 26 : 27 : 28, the third and first plates being of same width and the head much wider than the first.

Head cordate, considerably more strongly narrowed cephalad of eyes than usual. Widest near marginal interruptions. Longer than wide in ratio 15 : 14, very nearly. Hairs long, few.

Antennae short. Consisting of the usual twenty articles which, excepting the first two and the ultimate, are short. Ultimate nearly equalling the three preceding taken together.

Eye consisting of six ocelli arranged in two longitudinal series: *e. g.*, 1 + 3, 2; 1 + 2, 3. Deeply pigmented. Single ocellus but little enlarged. Those of upper series larger than those of lower.

Prosternum 1.6 times wider than long. Teeth of moderate size with sides somewhat concave and apices narrowly rounded. Spine as usual.

First dorsal plate with sides convex toward ends but between these nearly straight, considerably diverging cephalad. Posterior minor plates with their corners obliquely truncate, the line of truncation making only a slight angle with the posterior margin. Hairs short and very sparse.

Coxal pores of moderate size: 3, 4, 4, 3.

Ventral spines of first legs, 0, 0, 1, 2, 1; of the sixth and seventh, 0, 0, 1, 3, 2; of the ninth, 0, 0, 2, 3, 2; of the anal, 0, 1, 3, 2, 0.

Anal legs distally conspicuously flattened with tarsus somewhat clavately widening distad. Proximal joints laterally longitudinally sulcate and at some time complanate.

Length 8 mm.; width of tenth plate 1 + mm.; length of antenna and of anal leg, 2.9 mm.

TYPE LOCALITY.— California: Shasta Springs, 1902. R. V. Chamberlin.

Known only from the type specimens.

PAOBIUS, gen. nov.

Lateral margins of head continuous, without any abrupt interruptions (Plate **4**, fig. 3).

Antennae short, consisting normally of twenty articles.

Eyes composed of ocelli arranged in two or three series. Single ocellus differentiated, equal to or larger than largest of others.

Prosternal teeth 2 + 2, with line of apices straight or nearly so, and the dental line one fourth or less the distance between the chitinous spots. Sinus proportionately large, v-shaped. Spine stout at base but distally attenuated and bristle-like (Plate **3**, fig. 3).

Posterior angles of none of the dorsal plates produced.

Coxal pores small and circular, uniseriate.

Claw of female gonopods tripartite; the lateral lobes equal and at same level, smaller than the median though not much so; or bipartite and with lobes equal. Basal spines 2 + 2, long and narrowest near middle (Plate **4**, figs. 2, 4).

Tarsi of anterior legs with division indicated by a pale transverse line.

Anal and penult legs without special lobes or other modifications in either sex. Last one or two pairs of coxae laterally armed or rarely, none laterally armed (*P. vagrans*). Third joint of all but the first pair of legs with three dorsal spines or rarely that of first 12 or 13 pairs with but 2 (*P. vagrans*). First seven to eleven pairs of legs with but a single dorsal spine on the fifth joint. Dorsal spines of anal legs 1, 0, 3, 0, 0 or 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0; claw single. Dorsal spines of penult legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1; claws 3, the anterior accessory being long, straight and spine-like. Dorsal spines of thirteenth legs 1, 0, 3, 1, 0 or 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2 to 0, 1, 2, 3, 2 or 0, 0, 2, 3, 2 and 0, 1, 3, 3, 1. Dorsal spines of twelfth legs 1, 0, 3, 1, 0 to 0, 0, 3, 1, 1 and 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 0, 0, 3, 1, 1 to 0, 0, 2, 1, 2 and 0, 0, 3, 2, 2; ventral, 0, 0, 2, 3, 1 or 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 to 0, 0, 2, 1, 1 and 2, 2, 1; ventral, 0, 0, 1, 1, 1 to 0, 0, 1, 3, 1 and 2, 1, 1.

FIG. 3.— Distribution of Paobius.

Length 9 mm. and less.

TYPE.— *P. boreus*, sp. nov.

The five species at present known are small forms from 7 to 9 mm. in length, these being known at present as occurring in British Columbia, on Forrester Island off the southern Alaskan Coast, and in the mountains of Vermont. It is evidently a boreal genus and will probably be found at various points in Canada. In general appearance the species resemble the more typical members of Oabius. They are at once distinguished from species of other genera by the characteristic structure of the lateral margin of the head which, as in Bothropolys, is not interrupted or broken between the caudal corners and the eyes or only very vaguely so. The partial division of the anterior tarsi indicated by pale transverse line or by partial suture on ventral side is a correlated character of importance. The three distinct claws of the penult legs, of which the anterior one is long, is an important characteristic in comparing with Oabius. The presence of only a single dorsal spine on the fifth joint of the first nine to eleven pairs of legs and the absence of any spine at all from this joint in the penult legs, are unusual characters also differentiating these species. The presence of three dorsal spines on the third joint of all but the first pair of legs in all but the Vermont species (*P. vagrans*) may also be noted. The form of the basal spines of the female gonopods is generally characteristic, though in this regard the Vermont species is again divergent.

Key to the Species of Paobius.

a. Dorsal spines of anal legs 1, 0, 3, 0, 0 or 1, 0, 2, 0, 0.

b. None of the posterior coxae laterally armed; ventral spines of thirteenth legs 0, 1, 3, 3, 1; third joint of first ten or more pairs of legs with but two dorsal spines.
P. vagrans, sp. nov.

bb. Last two pairs of coxae laterally armed. Ventral spines of thirteenth legs 0, 1, 2, 3, 2 or 0, 0, 2, 3, 2; third joint of all legs with three dorsal spines..... *P. boreus*, sp. nov.

aa. Dorsal spines of anal legs 1, 0, 3, 1, 0.

b. Fifth joint of sixth to ninth pairs of legs with but one ventral spine; head equal in length and breadth.
P. columbiensis, sp. nov.

bb. Fifth joint of sixth to thirteenth pairs of legs with two ventral spines; head wider than long..... *P. orophilus*, sp. nov.

Paobius boreus, sp. nov.

Plate **3**, fig. 7–9; Plate **4**, fig. 1–3.

Diagnosis.— Slender; first dorsal plate 1.6 times wider than long; head much wider than long. Brown to chestnut, head lighter. Ocelli twelve to fourteen in three series. Prosternum with distance between chitinous spots 4.25 times dental line; sinus wide, u-shaped. Lobes of genital forceps acute; basal spines narrowed near middle, clavate distad. Coxal pores 2, 3, 3, 2. Last two pairs of coxae laterally armed. Third joint of all legs with three dorsal spines. Spines of anal legs, dorsal, 1, 0, 3, 0, 0; of penult, dorsal, 1, 0, 3, 1, 0; of thirteenth, ventral, 0, 1, 2, 3, 2 or 0, 0, 2, 3, 2, dorsal, 1, 0, 3, 1, 0; of twelfth, dorsal, 1, 0, 3, 1, 0; of first, ventral, 0, 0, 1, 3, 1, dorsal, 0, 0, 2, 1, 1. Length 8 to 9 mm.

Description.— Dorsum brown to chestnut. Head lighter, of ferruginous tinge; commonly with a dark spot in front of the caudal border. Antennae dark, paler, rufous or yellowish, at tips or in same over distal half or more of length. Posterior legs usually but slightly, if at all, more brightly colored than others. Venter much paler than the dorsum, clear brownish grey; most of the caudal plates chestnut. Prosternum and prehensors dilute chestnut.

Body rather slender, being from 8.5 to 9 times longer than wide. Conspicuously narrowed cephalad, with first plate narrower than third and much narrower than head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other about as 58 : 51 : 54 : 65 : 67 : 65.

Head (Plate **4**, fig. 3) wider than long in about ratio 58 : 53.

Antennae short. Articles distad of the second decreasing regularly, short and very short, compact. Ultimate article distinctly longer than the two preceding taken together.

Eyes each consisting of mostly twelve to fourteen ocelli (Plate **3**, fig. 7) arranged in three series: *e. g.*, 1 + 5, 4, 2, which is the commonest number and arrangement; 1 + 6, 4, 3; 1 + 5, 4, 3; 1 + 3, 4, 4. Single ocellus distinctly largest. Other ocelli dark, regular. Ocelli of most ventral row reduced, those of others decreasing cephalad. Organ of Tömösvary small, ordinarily not detectable in lateral view of head.

Prosternum in type 1.57 times wider than long. Distance between chitinous spots $1\frac{2}{3}$ times width at level of bottom of median sinus;

4.25 times length of dental line. Teeth acute, the inner one of each pair a little larger than the outer so that the line of apices is straight or very nearly so. Median sinus wide, somewhat u-shaped but subacute at bottom (Plate 3, fig. 8).

First dorsal plate widest cephalad, moderately narrowing caudad; 1.6 times wider than long. Posterior corners of ninth, eleventh, and thirteenth dorsal plates more or less oblique.

Coxal pores, 2, 3, 3, 2.

Spines of first legs, $\frac{0,\,0,\,2,\,1,\,1}{0,\,0,\,1,\,3,\,1}$; of the second, $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,1,\,3,\,1}$ or $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,1,\,3,\,1}$; of the third to seventh, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,1,\,3,\,1}$; of the eighth, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,1,\,3,\,1}$ or $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,1}$, the dorsal spine of fifth joint on anterior side of joint; of the ninth to eleventh, $\frac{0,\,0,\,3,\,1,\,1}{0,\,0,\,2,\,3,\,1}$, with dorsal spine of fifth joint also on anterior side; of the twelfth, $\frac{1,\,0,\,3,\,1,\,0}{0,\,0,\,2,\,3,\,2}$; of the thirteenth, $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,2,\,3,\,2}$ or $\frac{1,\,0,\,3,\,1,\,0}{0,\,0,\,2,\,3,\,2}$; of the penult, $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,3,\,3,\,1}$, of the anal, $\frac{1,\,0,\,3,\,0,\,0}{0,\,1,\,3,\,2,\,0}$. Last two pairs of coxae laterally armed.

Anal legs a little and uniformly thickened to the tarsi which are slender; but slightly if at all more thickened in male than in female; dorsally somewhat complanate and weakly longitudinally furrowed.

Gonopods of male small, wart-like, each bearing two moderately long bristles.

Claw of female gonopods (Plate 4, fig. 1) short, of uniform width from base to teeth; tripartite, teeth acute, the median longer than the lateral which are subequal. Basal spines with the inner one of each pair shorter than the outer; constricted near middle of length and then, especially in the outer one, widening clavately rather conspicuously and characteristically to the short acuminate portion (Plate 4, fig. 2).

Length 8 to 9 mm.

Immaturus.—Light brown. Head and prehensors somewhat orange. Anal legs brighter at distal ends.

Antennae with twenty articles present. First three or four articles conspicuously longest; the others very short; ultimate article proportionately longer than in adult.

Ocelli 1 + 3, 2. The single ocellus and adjacent seriate one of same size or nearly so. Ocelli pale and distinct, anterior ones smallest as usual.

Prosternum nearly as in adult. Line of apices of teeth nearly straight. Sinus v-shaped.

Coxal pores very small: 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the second to sixth, $\frac{0,0,2,1,1}{0,0,0,1,1}$; of the seventh to ninth, $\frac{0,0,2,1,1}{0,0,2,2,1}$, the dorsal spine of fifth joint anterior in position; of the tenth, $\frac{0,0,3,1,1}{0,0,2,3,1}$, dorsal spine of tibia anterior in position; of the eleventh, $\frac{0,0,3,1,0}{0,0,2,3,1}$; of the twelfth, $\frac{1,0,3,1,0}{0,0,2,3,1}$; of the thirteenth, $\frac{1,0,3,1,0}{0,1,2,3,1}$ or $\frac{1,0,3,1,0}{0,0,2,3,1}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,0,0}{0,1,3,2,0}$.

Gonopods of female with the three articles distinct, the ultimate bearing a claw which is small, slender and acute and spine-like. Third article without bristles; the second one with a single ventral bristle; and the first one with two.

Length 5.5 to 6.5 mm.

Agenitalis II.— Dilute brown. Head orange. Antennae pale brown, orange at tips. All legs with tarsi somewhat orange.

Articles of antennae nineteen. Articles distad of the third, excepting the ultimate, very short; the twelfth and thirteenth in specimen described shorter than the adjacent ones, having been apparently formed by recent subdivision of one article. Ultimate article about as long as the three preceding ones taken together.

Ocelli 1 + 3, 2. First ocellus of upper series largest, the anterior one of this series very small. Ocelli all pale.

Prosternum as in older stages.

Coxal pores very small: 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,0,1}$; of the second, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the third to ninth, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the tenth, $\frac{0,0,2,1,0,(1)}{0,0,1,1,1}$; of the eleventh, $\frac{0,0,2,1,0}{0,0,1,1,1}$; of the twelfth, $\frac{0,0,2,1,0}{0,0,1,2,1}$; of the thirteenth, $\frac{0,0,2,0,0}{0,0,1,1,1}$; of the penult, $\frac{0,0,2,0,0}{0,1,3,1,1}$; of the anal, $\frac{0,0,2,0,0}{0,1,3,2,0}$. None of the posterior coxae as yet laterally armed.

Gonopods of female biarticulate. No claw indicated but one ready to have appeared with the next moult showing through integument in cleared specimen. No bristles present but a spine is indicated on proximal article as a small acute chitinous point.

Length 5 mm.

Pullus IV (*Larva quarta*).— Pale, for the most part unpigmented or nearly so. Head and antennae yellowish, also the caudal end of the body and slightly so the tarsi of some of the legs.

Antennae composed of seventeen articles of which those between the third and the ultimate are very short and closely compacted.

Ocelli 1 + 1; the anterior one the larger; both somewhat angular.

Prosternum nearly as in older stages. Sinus v-shaped with sides a little excurved.

One coxal pore present on coxa of each twelfth leg.

Twelve pairs of developed legs present, with the remaining three pairs appearing as slender buds.

Spines of first to third pair of legs, $\frac{0,0,0,0,1}{0,0,0,0,1}$; of fourth to ninth, $\frac{0,0,0,0,1}{0,0,0,0,1}$; of tenth to twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$.

Anal glands distinct and well developed.

Length 2.8 mm.

Pullus III (*Larva tertia*).— Very pale and almost without pigment excepting the head, prehensors, and antennae which are of yellow or orange cast.

Antennae composed of fourteen articles.

Ocelli 1 + 1 of which the anterior is the larger.

Prosternal teeth small, acute; line of apices slightly recurved. Sinus strictly v-shaped.

Pairs of developed legs ten, behind which are two pairs of slender buds which distad of the coxa are unsegmented. Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,0,0}$; of the second to seventh, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the eighth and ninth, $\frac{0,0,0,0,0}{0,0,0,1,1}$; of the tenth, $\frac{0,0,0,0,0}{0,0,1,1,0}$.

Anal glands well developed.

Length 2.5 mm.

Type.— M. C. Z., No. 345, Alaska: Forrester Island. Harold and R. W. Heath.

Paratypes.— M. C. Z., No. 346–349, 418, Alaska: Forrester Island. Harold and R. W. Heath.

This species is readily recognized through the absence of a dorsal spine on the fourth joint of the anal legs. The only other known western lithobiid having this characteristic spining in the anal legs is *Oabius tabiphilus*, from Santa Barbara.

Paobius columbiensis, sp. nov.

Plate 4, fig. 4.

Diagnosis.— First dorsal plate 1.5 times wider than long; head equal in length and breadth. Body and head above light yellowish brown. Ocelli ten to twelve in two or three series. Prosternum with distance between chitinous spots four times the dental line; sinus widely v-shaped. Two lateral lobes of genital forceps equal, a little smaller than the median; basal spines long and slender, nar-

rowest near middle. Coxal pores 2, 3, 3, 3. Last pair of coxae laterally armed. Fifth joint of sixth to ninth pairs of legs with but one ventral spine. Spines of anal legs, dorsal, 1, 0, 3, 1, 0; of penult, dorsal, 1, 0, 3, 1, 0, ventral, 0, 1, 3, 3, 1; of thirteenth, ventral, 0, 1, 3, 3, 2, or 0, 0, 2, 3, 2, dorsal, 1, 0, 3, 1, 1; of twelfth, dorsal, 0, 0, 3, 1, 1; of first, ventral, 0, 0, 1, 1, 1 or 0, 0, 1, 2, 1, dorsal, 0, 0, 1, 1, 1. Length 7–8 mm.

Description.— Dorsum light yellowish brown or orange-brown, with head not darker in types. Antennae yellowish brown. Posterior legs bright yellow.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 52 : 44 : 46 : 59 : 61 : 58. Head precisely equal in length and breadth.

Antennae of moderate shortness. Articles short, decreasing regularly distad in the usual way. Ultimate article considerably longer than the two preceding taken together but shorter than the three preceding.

Ocelli ten to twelve in two or three series: *e. g.*, 1 + 4, 4, 3; 1 + 5, 4, 1; 1 + 5, 5. Single ocellus but a little larger than the most caudal ones of series. Other seriate ocelli mostly very small. Deeply pigmented.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.5 times width at sinus and 4 times length of dental line. Teeth small and rather close, the interval between those of each pair semicircular. Line of apices very nearly straight. Spine close to base of outer tooth, bending mesocephalad over it, of usual character. Sinus widely v-shaped, the interval between the two mesal teeth being greater than that between teeth of each pair.

First dorsal plate moderately narrowed caudad of middle in front of which the sides are subparallel. 1.5 times wider than long. Posterior angles of ninth, eleventh, and thirteenth dorsal plates straight.

Coxal pores 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,2,1}$ or $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the second to eighth, $\frac{0,0,3,2,1}{0,0,1,2,1}$; of the ninth, $\frac{0,0,3,2,1}{0,0,1,3,1}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last pair of coxae laterally armed.

Claw of female gonopods tripartite, the two lateral lobes equal and at same level, a little smaller than the median, all rather blunt. Spines 2 + 2 or 2 + 3; long and slender, broadest at base and nar-

rowing to near middle above which again widening to beginning of the acuminate tip which is of moderate length; inner spine curving somewhat mesad (Plate **4**, fig. 4).

Length 7 to 8 mm.

Type.— M. C. Z., No. 350, British Columbia: Kaslo.

Paratypes.— M. C. Z., No. 417, British Columbia: Kaslo.

Paobius orophilus, sp. nov.

Diagnosis.— First dorsal plate 1.7— times wider than long; head wider than long. Brown; head much darker, nearly black. Ocelli about thirteen in three series. Prosternum with distance between chitinous spots four times the dental line; sinus v-shaped. Genital forceps bipartite or tripartite with outer tooth small; basal spines long, inner as long as or a little longer than outer. Coxal pores 2, 3, 3, 3. Last pair of coxae laterally armed. Fifth joint of sixth to thirteenth pairs of legs with two ventral spines. Spines of anal legs, dorsal, 1, 0, 3, 1, 0; of penult, dorsal, 1, 0, 3, 1, 0; of thirteenth, ventral, 0, 0, 3, 3, 2, dorsal, 1, 0, 3, 1, 1; of twelfth, dorsal, 0, 0, 3, 1, 1; of first, ventral, 0, 0, 1, 2, 1, dorsal, 0, 0, 3, 2, 1. Length 9 mm.

Description.— The dorsum in type is uniform brown. Head much darker, blackish with no tinge of red, uniform. Antennae like head excepting the tips which are light, yellowish. Venter, prosternum, and prehensors light brown or testaceous. Legs like venter, the caudal pairs a little darker, uniform.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 52 : 42 : 47 : 56 : 57 : 55. Head wider than long in ratio 52 : 50 or 52 : 49.

Antennae short, rather stout and only moderately attenuated distad. Articles short, each a little clavate. Ultimate article a little longer than the two preceding taken together, as usual.

Ocelli in type thirteen in three series: thus, 1 + 5, 4, 3. Single ocellus distinctly largest, circular. Other ocelli large, distinct, and regular. Ocelli deeply pigmented excepting the single ocellus and the most caudal one of the uppermost series.

Prosternum in type 1.53 times wider than long. Each side of anterior portion conspicuously inbent between spine and caudal or end or that adjacent to prehensor. Distance between chitinous spots 2.85 times width at level of bottom of sinus; 4 times the dental line.

Teeth small, acute, the inner of each pair the larger and the line of apices thus very nearly straight. Sinus strictly v-shaped. Spine as usual.

First dorsal plate moderately narrowed caudad; 1.68 times wider than long. Caudal margins of ninth, eleventh, and thirteenth dorsal plates rounding forward at lateral ends, but not truly obliquely truncate.

Coxal pores very small, 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,3,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,3,2,1}{0,0,1,3,1}$; of the fourth and fifth, $\frac{0,0,3,2,1}{0,0,1,3,1}$; of the sixth to eighth, $\frac{0,0,3,2,1}{0,0,1,3,2}$; of the ninth to eleventh, $\frac{0,0,3,2,1}{0,0,2,3,2}$, the dorsal spine of tibia being on the anterior side instead of on the posterior as more usual; of the twelfth, $\frac{0,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,3,0}$, claws three, all distinct; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Only anal coxae laterally armed.

Claw of female gonopods long and strongly curved, not excavated, thin and rather slender; bipartite, with the lobes equal, acute or tripartite, a smaller outer claw being thus present. Spines long and slender, equal in length or the inner a little the longer; in ventral view the inner spine is acuminate from base and is distally acute, but the outer is narrowed about one third the distance from the distal end toward which it is a little expanded and which is truncate or at middle a little incised.

Length of type 9 mm.

Type.— M. C. Z., No. 351, British Columbia: Kaslo.

Paratypes.— M. C. Z., No. 416, British Columbia: Kaslo.

This species differs from *P. columbiensis*, occurring in the same locality, in larger size, coloration, spining of part of legs, different proportions of head, form of prosternum and especially in having the claw of the female gonopods more slender and curved and only bipartite, with the basal spines of a distinctly different form.

Paobius vagrans, sp. nov.

Diagnosis.— First dorsal plate 1.65+ times wider than long; head wider than long. Dorsum yellowish brown with head chestnut or cherry-red. Ocelli six to nine in two or three series. Prosternum with distance between chitinous spots 4— times the dental line;

sinus large, v-shaped. Claw of gonopods tripartite; outer basal spine broad, much larger than the inner. Coxal pores 2, 3, 3, 2 to 3, 4, 4, 3. None of the coxae laterally armed. Third joint of first ten or more pairs of legs with but two dorsal spines. First seven pairs of legs with but a single dorsal tibial spine. Spines of anal legs, dorsal, 1, 0, 3, 0, 0 or 1, 0, 2, 0, 0; of penult, dorsal, 1, 0, 3, 1, 0 or 1, 0, 2, 1, 0; of thirteenth legs, ventral, 0, 1, 3, 3, 1, dorsal, 1, 0, 2, 1, 1; of twelfth, dorsal, 0, 0, 3, 2, 2 or 0, 0, 3, 1, 2; of first, ventral, 0, 0, 1, 1, 1 or 0, 0, 2, 1, 1; dorsal, 0, 0, 2, 2, 1. Length, 7.5–9 mm.

Description.— Dorsum yellowish brown, with some of the plates occasionally showing a greenish tinge. Head from somewhat ferruginous to chestnut and cherry-red in individuals in full color, the first dorsal plate also more or less darkened like the head. Antennae colored like the head proximally, yellowish or orange distally. Venter a little paler than dorsum, sometimes in part showing a greenish tinge. Prosternum and prehensors a little paler than the head. Legs pale brown or brownish yellow, the caudal pairs more densely pigmented, bright orange-yellow.

Body considerably narrowed cephalad from the tenth plate, with the first plate much narrower than the head but only slightly or not at all narrower than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 48 : 43 : 43+ : 52: 55 : 54.

Head wider than long in about ratio 48 : 45. Caudal margin widely incurved. Lateral breaks may be more or less vaguely indicated.

Antennae very short, the articles decreasing regularly from second to the penult, short and very short. Ultimate article distally acuminate, longer than the two preceding taken together.

Ocelli six to nine in two or three series: *e. g.*, 1 + 3, 2; 1 + 3, 3; 1 + 3, 2, 1; 1 + 4, 3, 1. Single ocellus distinctly largest.

Prosternum with teeth equal, the line of apices a little recurved. Incision of good size, of the usual v-shape. Spine stouter at base than the bristle, slenderly acuminate and bristle-like distad, inserted in usual position. In type 1.54 times wider than long. Distance between chitinous spots 2.6 times width at level of bottom of incision; 3.9 times length of the dental line.

First dorsal plate with sides convex anteriorly and caudally, substraight between, considerably converging caudad; 1.65 times wider than long. Caudal margin of ninth, eleventh, and thirteenth dorsal plates straight, the corners not excised or but indistinctly so.

Coxal pores small: 2, 3, 3, 2; 2, 3, 3, 3; 3, 3, 3, 3; 2, 4, 4, 2; 3, 4, 4, 3.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,2,1,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,3,1}$; of the third, $\frac{0,0,2,2,1}{0,0,0,1,3,1}$, $\frac{0,0,2,2,1}{0,0,0,0,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,0,3,1}$; of the fourth, $\frac{0,0,2,2,1}{0,0,0,0,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,0,3,1}$; of the fifth, $\frac{0,0,2,2,1}{0,0,0,0,3,1}$; of the sixth, $\frac{0,0,2,2,1}{0,0,0,1,3,1}$ or $\frac{0,0,2,2,1}{0,0,0,0,3,1}$; of the seventh, $\frac{0,0,2,2,1}{0,0,0,0,3,1}$; of the eighth, $\frac{0,0,2,2,1}{0,0,0,0,3,2}$ or $\frac{0,0,0,2,2,2}{0,0,0,0,3,2}$; of the ninth, $\frac{0,0,2,2,2,2}{0,0,0,0,3,2}$; of the tenth, $\frac{0,0,2,2,2,2}{0,0,0,2,3,2}$; of the eleventh, $\frac{0,0,0,2,1,2}{0,0,0,2,3,2}$; of the twelfth, $\frac{1,0,2,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,3,3,1}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,3,1}$ or $\frac{1,0,2,1,0}{0,1,3,3,1}$, claws three; of the anal, $\frac{1,0,3,0,0}{0,1,3,2,0}$ or $\frac{1,0,2,0,0}{0,1,3,2,0}$, the coxal spine sometimes doubled, claw one. None of the coxae laterally armed.

Claw of female gonopods short and relatively wide, well curved, tripartite, the median lobe longest, all acute. Outer basal spine of each pair longer and much wider than the inner with its sides proximad of the apical portion straight and parallel; apical portion moderate in length and acuteness, weakly denticulate on outer edge or also on mesal. Inner spine in ventral view acuminate from near base, denticulate along ectal edge.

Length from 7.5 to 9 mm.

Type.— M. C. Z., No. 352, Vermont: St. Johnsbury. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 412, Vermont: St. Johnsbury; M. C. Z., No. 414, Lake Carmi. R. V. Chamberlin.

This species is aberrant, especially in the character of basal spines of the female gonopods and in lacking lateral coxal spines.

Arebius, gen. nov.

Head with the usual marginal interruptions.

Antennae short; composed of twenty articles.

Eyes composed of moderate or large ocelli arranged in two or three or occasionally in four longitudinal series. Single ocellus clearly differentiated and conspicuously larger than the others.

Prosternal teeth 2 + 2; line of apices recurved; sinus v-shaped; spines slender and distally bristle-like.

Posterior angles of ninth, dorsal plate straight or obliquely somewhat excised; of the eleventh and thirteenth from somewhat obliquely truncate to straight or very weakly extended caudad.

Coxal pores small and circular; uniseriate.

Claw of female gonopods either large and strictly entire (Hesperobius *sens. str.*); or smaller and bipartite or tripartite with the main lobe or lobes greatly exceeding the lateral one or ones (Pagobius). Basal spines 2 + 2, long and mostly moderately slender.

Tarsi of anterior legs slender with division indicated by an abrupt narrowing evident especially on the ventral side and by a paler, less chitinous transverse line or narrow band, and sometimes in addition by a mostly partial suture.

Posterior legs comparatively slender in both sexes; without special modification in the male. Last one or two pairs of coxae laterally armed. From six to eleven last pairs of legs with the third joint bearing three dorsal spines. Either all legs from the first to the eleventh, twelfth, or thirteenth, or all excepting the first one, two, three, or four pairs bearing two dorsal spines on the fifth joint. Usually the first five to eight pairs of legs, but rarely only the first two pairs, with but a single ventral spine on the third joint. Dorsal spines of anal legs, 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 0 (normal in Pagobius) to 0, 1, 3, 2, 1 or 0, 1, 3, 3, 1 (Arebius *sens. str.*); claws either one or two. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; claws three, the anterior commonly short but rather stout and somewhat truly claw-like. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 to 1, 0, 3, 2, 2; ventral, 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of twelfth legs from 0, 0, 3, 1, 1 and 1, 0, 3, 1, 1 to 0, 0, 3, 1, 2 and 1, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2 or rarely 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 0, 0, 3, 2, 2; ventral, 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 2, 1, 1 or less commonly, 0, 0, 2, 2, 1; ventral, 0, 0, 1, 2, 1 or 0, 0, 1, 3, 1.

Length 12 mm. and less.

Type.— *A. medius*, sp. nov.

The species of this genus at present known occur in California with the exception of *A. oregonensis*, the types of which were taken at Portland, Oregon. They are forms of small or medium size, from brown to chestnut in color, in which the body is rather conspicuously narrowed cephalad from the tenth plate, with the head proportionately rather small.

The species fall into two natural groups or subgenera; Arebius *sens. str.*, embracing species in which the claw of the female gonopods is large and strictly entire and the ventral spines of the anal legs normally 0, 1, 3, 2, 1 or occasionally 0, 1, 3, 3, 1; and Pagobius, subgen. nov., with *P. diplonyx*, sp. nov. as the type, embracing species in which the claw of the female gonopods is smaller and either bipartite

or tripartite, one or two small teeth appearing on sides of the main claw, and the ventral spines of the anal legs normally 0, 1, 3, 2, 0. Sometimes immature specimens of species of Arebius *sens. str.* (*e. g. A. obesus*) have minute lateral teeth near the base, but these invariably disappear by the time the *maturus* stage is reached. The smallness of the lateral tooth or teeth in the claw of the gonopod of species of Pagobius and the proximal position of the same clearly indicate a transition to the condition of integrity normal in Arebius proper.

Key to Subgenera and Species of Arebius.

a. Claw of ♀ gonopods strictly entire; ventral spines of anal legs normally 0, 1, 3, 2, 1 or 0, 1, 3, 3, 1. . *Arebius sens. str.*

b. Only the last pair of coxae laterally armed.
A. oregonensis, sp. nov.

bb. Last two pairs of coxae laterally armed.

c. Anal leg with the claw single. . . . . *A. obesus* (Stuxberg)

cc. Anal legs with two claws.

d. Ventral spines of anal legs 1, 3, 3, 1; only the first two pairs of legs with third joint bearing but a single ventral spine, the others with 2 or 3. . . . *A. elysianus*, sp. nov.

dd. Ventral spines of anal legs 1, 3, 2, 1; first 7 pairs of legs with the third joint bearing a single ventral spine.
A. medius, sp. nov.

aa. Claw of ♀ gonopods bipartite or tripartite; ventral spines of anal legs normally 1, 3, 2, 0. . . . . *Pagobius*, subgen. nov.

b. Claw of anal leg single. . . . . *A. dolius*, sp. nov.

bb. Anal leg with two claws.

c. Claw of ♀ gonopods bipartite; basal spines slender, narrowed from base distad; head wider than long; first dorsal plate cir. 1.8 times wider than long. . . . *A. kochii* (Stuxberg)

cc. Claw of ♀ gonopods tripartite; basal spines stout, only slightly or not at all narrowed from base to the acuminate apical portion; head equal in length and breadth; first dorsal plate cir. 1.6 times wider than long.
A. diplonyx, sp. nov.

Fig. 4.— Distribution of Arebius.

Arebius obesus (Stuxberg).

Plate **7**, fig. 3, 4; Plate **8**, fig. 1.

Lithobius obesus, Stuxberg, Öfvers. K. vet.-akad. Förhandl., 1875, **32**, no. 2, p. 67; Ann. mag. nat. hist., 1875, ser. 4, **15**, p. 189. Chamberlin (in part), Pomona college journ. ent., 1910, **2**, p. 371, 373. Can. ent., 1911, **43**, p. 380.

Lithobius (*Archilithobius*) *obesus* Stuxberg, Öfvers. K. vet.-akad. Förhandl., 1875, **32**, no. 3, p. 18, 31; Proc. Cal. acad. sci., 1877, **7**, p. 138.

Non *Lithobius obesus* Bollman, Proc. U. S. N. M., 1889, **11**, p. 347.

Diagnosis.— Slender; first dorsal plate 1.5 + times wider than long; head as long as wide. Brown; head, and sometimes posterior plates, reddish. Ocelli eight to fourteen in three series. Prosternum 1.6 + times wider than long; distance between chitinous spots four times the dental line; sinus v-shaped. Claw of gonopods large, entire; basal spines moderate, acuminate from base. Coxal pores 2, 3, 3, 2 to 4, 4, 4, 4. Claw of anal leg single. Last two pairs of coxae laterally armed. First eight pairs of legs with third joint bearing but a single ventral spine. Spines of anal legs, ventral, 0, 1, 3, 2, 1; of thirteenth, dorsal, 1, 0, 3, 1, 1, ventral, 0, 1, 3, 3, 2; of twelfth, dorsal, 1, 0, 3, 1, 1, ventral, 0, 0, 2, 3, 2; of first, dorsal, 0, 0, 2, 2, 1. Length, 9 to 12 mm.

Description.— Dorsum brown, the caudal plates sometimes with tendency toward reddish. Head of a similar brown color or in some more reddish, the frontal region paler. Antennae brown, but little paler at tips. Prosternum somewhat paler than head with the prehensors a little lighter. Venter testaceous or yellowish with the caudal plates darker. Legs pale excepting the posterior pairs which are darker in correspondence with the ventral plates.

Body rather slender, usually from 8.5 to 9.25 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 30 : 28 : 29 : 33: 34 : 33.

Head as long as wide or slightly longer; caudal margin mesally slightly incurved. Obscurely punctate.

Antennae short, reaching the fifth body-segment. Articles short, sides nearly straight, each article a little clavately widening distad.

Each eye consisting of from eight to fourteen ocelli arranged in three series: *e. g.*, 1 + 3, 3, 1; 1 + 4, 3, 1; 1 + 4, 3, 2; 1 + 4, 4, 2; 1 + 5, 4, 3; 1 + 5, 5, 3. Single ocellus much larger than any of the

seriate ocelli, the most caudal ocellus of each of the two upper rows also commonly large, others decreasing in size cephalad and ventrad.

Prosternum about 1.62 times wider than long. Distance between chitinous spots near 2.36 times width at level of bottom of sinus; 4 times the length of the dental line. Teeth small, acute, dark; line of apices a little recurved. Sinus v-shaped. Spines slender and distally bristle-like.

First dorsal plate 1.55+ times wider than long. Sides caudad more than usually strongly rounded and converging about caudal corners, cephalad only gently convex and diverging. Caudal corners of minor plates and of the seventh obliquely excised. Plates smooth and shining.

Coxal pores very small, circular: 2, 3, 3, 2; 3, 3, 3, 3; 3, 4, 4, 3; 4, 4, 4, 4.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the third and fourth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the sixth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$ to $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the seventh, $\frac{0,0,2,2,2}{0,0,1,2,2}$ or $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the eighth, $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claw one. Last two pairs of coxae laterally armed.

Claw of female gonopods (Plate 7, fig. 4) moderately large and rather strongly curved; entire, with no trace of lateral teeth, acute. Basal spines (Plate 7, fig. 3) 2 + 2 or 2 + 3; of moderate length, slender, acuminate from near base; the plane of dorsal excision long. Mesal side of first joint (Plate 8, fig. 1) diverging considerably from its fellow cephalad. Process of sternite truncate.

Length mostly 9 to 12 mm. A male 11 mm. long has antennae 3.5 mm. in length and the tenth dorsal plate 1.24 mm. wide.

Immaturus (♂).— Head slightly longer than wide as in *maturus*. Antennae with the full number of articles present but those of distal half, especially, relatively shorter than in adult.

Ocelli of same form and arrangement as in *maturus*, the number being also nearly the same.

Prosternum essentially as in adult but distance between chitinous spots may be as much as 3 times width at level of bottom of sinus.

Coxal pores, 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,0,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,0,2,1}$; of the third and fourth, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fifth to eighth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the ninth,

$\frac{0,0,3,2,2}{0,0,1,2,1}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$. Last two pairs of coxae laterally armed.

Specimen described from Stanford.

Pullus IV (*Larva quarta*).— Very pale, yellowish brown, apparently violaceous in life. Head yellow of a dilute orange or ferruginous tinge, paler in front of suture. Antennae pale brown, lighter at tips. Prosternum nearly like head. Venter pale. Legs white or nearly so proximally, the tarsi with some yellow pigment.

Head longer than wide (29 : 28).

Antennae composed of seventeen articles, of which those between the third and the ultimate are very short, and more or less moniliform.

Ocelli 1 + 2, 1 single ocellus already largest.

Prosternal teeth small and pale. Prosternum 1.53 times wider than long. Distance between chitinous spots 2.56 times width at level of bottom of sinus; 4.1 times length of dental line.

Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other as 28 : 23 : 25 : 27 : 25 : 22.

First dorsal plate conspicuously narrowed caudad; 1.6 times wider than long.

Coxal pore one on each twelfth coxa.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,0,1}$; of the second to ninth, $\frac{0,0,0,0,0}{0,0,0,1,1}$; of the tenth, $\frac{0,0,0,0,0}{0,0,0,1,1}$ to $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the eleventh and twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$. The spine on femur decreases in length cephalad.

Length of specimen described 4 mm., with antennae 1.5 mm. long.

Type Locality.— California: Sausalito.

Also taken in California at Stanford, (M. C. Z., No. 354, 445, 447); Santa Barbara, (M. C. Z., No. 449); Fresno, (M. C. Z., No. 448). R. V. Chamberlin.

Arebius medius, sp. nov.

Plate **7**, fig. 1.

Diagnosis.— First dorsal plate 1.45 times wider than long; head as long as wide. Dark brown to chestnut with head blackish. Ocelli eight or ten in two or three series. Prosternum 1.5 times wider than long; distance between chitinous spots $3\frac{2}{3}$ times the dental line; sinus v-shaped. Claw of female gonopods large, acute, entire; basal spines long and stout (Plate **7**, fig. 1). Coxal pores 2, 2, 2, 2 to 3, 4, 4, 3. Anal

leg with two claws. Last two pairs of coxae laterally armed. First seven pairs of legs with third joint bearing but a single spine. Spines of anal legs, ventral, 0, 1, 3, 2, 1; of thirteenth, ventral, 0, 1, 3, 3, 2, dorsal, 1, 0, 3, 1, 1; of twelfth legs, ventral, 0, 0, 2, 3, 2, dorsal, 0, 0, 3, 1, 2; of first legs, dorsal, 0, 0, 2, 1, 1. Length 8–11 mm.

Description.— Dark brown to chestnut, shining. Head darker, blackish. Antennae chestnut to blackish, light distad. Prosternum and prehensors dusky brown, the prehensors lighter, especially distad. Venter lighter, brown to light chestnut, the caudal plates sometimes darker. Legs brown, the caudal pairs darkest, sometimes irregularly dusky; tarsi of all legs paler, testaceous.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 60 : 55 : 60 : 69 : 69 : 68.

Head subrotund, broadly rounded anteriorly; caudal margin mesally a little incurved. Widest between eyes and marginal breaks. Equal in length and breadth or slightly wider.

Antennae and its articles of intermediate length. Articles cylindrical, those of distal portion becoming slender. Ultimate article a little clavately widening distad.

Ocelli in specimens examined mostly eight to ten in two or three series: *e. g.*, 1 + 4, 3; 1 + 4, 3, 2, which is the much commonest number and arrangement. Single ocellus much the largest. Most caudal one the largest of seriate ocelli. Organ of Tömösvary in outline a little smaller than the ocelli of lowermost series, situated ventrad of anterior end of eye patch.

Teeth of prosternum of moderate size, acute, uniform; the line of apices a little recurved. Sinus v-shaped, sides a little concave, of intermediate size; distance between two mesal teeth less than that between teeth of each pair. Spine slenderly acuminate, curving mesocephalad over ectal tooth. 1.5 times wider than long. Distance between chitinous spots 2.2 times width at level of bottom of sinus; $3\frac{2}{3}$ times length of dental line.

First dorsal plate 1.45 times wider than long; sides convex, considerably converging caudad. Posterior corners of ninth and eleventh dorsal plates obliquely excised or truncate, the line of truncation short, especially on thirteenth plate.

Coxal pores: 2, 2, 2, 2; 2, 3, 3, 2; 3, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$; of the third to seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the ninth to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 2}{0, 0, 2, 3, 2}$; of the thirteenth and

penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, claws two. Last two pairs of coxae laterally armed.

Claw of female gonopods large and strongly curved, entire; acutely pointed. Mesal side of first article straight, well chitinized and keel-like. Basal spines long and stout, the outer a little longer than the inner; both gradually acuminate from base distad, the tip very narrowly rounded (Plate 7, fig. 1).

Length 8 to 11 mm.

TYPE.— M. C. Z., No. 356, California: Brookdale, March, 1913. R. V. Chamberlin.

PARATYPES.— M. C. Z., No. 438, California: Brookdale, March, 1913. R. V. Chamberlin.

AREBIUS ELYSIANUS, sp. nov.

Plate 7, fig. 2.

DIAGNOSIS.— First dorsal plate $1\frac{2}{3}$ times wider than long; head slightly wider than long. Testaceous, with head darker reddish brown. Ocelli eight to twelve in three series. Prosternum 1.5 + times wider than long; distance between chitinous spots 3.6— times dental line. Claw of gonopods long, entire; spines moderate in length. Coxal pores 2, 2, 2, 2 to 3, 3, 3, 3. Anal leg with two claws. Last two pairs of coxae laterally armed. Third joint of all legs excepting the first two pairs bearing two or three spines. Spines of anal legs, ventral, 0, 1, 3, 3, 1; of thirteenth legs, ventral, 0, 1, 3, 3, 2, dorsal, 1, 0, 3, 2, 2; of twelfth legs, dorsal, 1, 0, 3, 2, 2, ventral, 0, 0, 3, 2, 2; of first legs, dorsal, 0, 0, 2, 2, 1. Length 8–12 mm.

DESCRIPTION.— Dorsum light yellowish or testaceous brown. Head dark brown of reddish cast, always distinctly and considerably darker than the dorsum; frontal region paler. Antennae like head, reddish brown, with tips in some degree paler. Prosternum somewhat lighter than head. Venter yellow or pale testaceous, caudal plates a little darker, usually somewhat reddish. Legs pale, the posterior pairs more deeply pigmented, mostly yellow or of a somewhat orange tinge.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 32 : 30 : 31 : 37 : 37 : 35.

Head slightly wider than long (32 : 31). Caudal margin straight,

otherwise head is suborbicular or sides somewhat flattened caudad of eyes.

Antennae short; composed of the usual twenty articles which are short; articles subcylindric or a little widening distad.

Ocelli eight to twelve in three series: *e. g.*, 1 + 3, 3, 2; 1 + 4, 3, 2; 1 + 4, 4, 3. Single ocellus largest. Of the seriate ocelli the caudal one of first row and of the second are largest, those of lowermost row smallest.

Prosternum in type 1.5+ times wider than long. Distance between chitinous spots 2.27 times width at level of bottom of sinus; 3.57 times the dental line. Teeth moderately small and acute with sides a little concave. Sinus rather shallow in proportion to its width; v-shaped but with sides a little concave. Spine moderately stout at base, becoming bristle-like distally.

First dorsal plate $1\frac{2}{3}$ times as wide as long; widest anteriorly, the sides rather conspicuously converging caudad. Minor plates mostly with the caudal margin straight entirely across width or with the caudal corners a little rounded or occasionally one corner excised.

Coxal pores small and circular, mostly well separated, few in number: *e. g.*, 2, 2, 2, 2; 2, 3, 3, 2; 2, 2, 3, 2; 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,2}{0,0,1,3,1}$; of the third, to fifth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the sixth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$, claws two. Last two pairs of coxae laterally armed.

Gonopods of male slender; well exposed; somewhat obliquely subconically rounded distally and bearing apparently but a single bristle.

Claw of female gonopods rather long and narrowly acutely pointed, moderately curved and entire with no indication of lateral teeth. Basal spines moderate in stoutness and length, acuminate regularly from base to apex; inner spine somewhat smaller than the outer (Plate 7, fig. 2). Inner side of first article weakly convex, only a little diverging cephalad from margin of its fellow.

Length 8 to 12 mm. A male 10 mm. long has antennae 3 mm. long and anal leg of same length or very nearly so.

Type.— M. C. Z., No. 444, California: Los Angeles, Elysian Park, June, 1909. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 355, 442, California: Pasadena; M. C. Z., No. 441, San Ysidro. W. M. Wheeler; M. C. Z., No. 443, Claremont. R. V. Chamberlin.

Arebius oregonensis, sp. nov.

Plate 7, fig. 6.

Diagnosis.— First dorsal plate 1.7 times wider than long; head as long as wide. Brown, head dark brown to chestnut. Ocelli ten to fourteen in four series. Prosternum with distance between chitinous spots only $3\frac{1}{3}$ times the dental line. Claw of female gonopods entire; basal spines long and slender, of uniform width, the outer but little longer. Coxal pores 4, 4, 4, 4. Only last pair of coxae laterally armed. Third joint of first five pairs of legs with a single ventral spine. Spines of thirteenth legs, ventral, 0, 1, 3, 3, 2, dorsal, 0, 0, 3, 1, 1; of twelfth ventral, 0, 0, 2, 3, 2 or 0, 0, 2, 3, 3, dorsal, 0, 0, 3, 1, 2. Length 10–12 mm.

Description.— Brown. Head darker, dark brown or chestnut. Antennae like head, uniform or paler distad. Prosternum and prehensors paler than the head. Venter brown with the caudal plates a little darker.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 75 : 69 : 72 : 88 : 90 : 84.

Head as wide as long or slightly longer (75 : 77). Rather strongly narrowed caudad of marginal breaks; caudal margin mesally a little incurved.

Antennae of moderate shortness. The articles of corresponding moderate length; usually not decreasing distad in usual way or only but few preceding the ultimate thus shortened, but sometimes those distad of third or fourth decrease in the ordinary way.

Ocelli ten to fourteen in four series: *e. g.*, 1 + 2, 4, 3, 1; 1 + 4, 4, 3, 1; 1 + 4, 4, 4, 1. Single ocellus much exceeding the others in size. Seriate ocelli comparatively rather large, regular. Organ of Tömösvary smaller in outline than the smaller ocelli, below the anterior end of which it is placed.

Teeth of prosternum very small and acute, equal; line of apices recurved. Sinus large, v-shaped, with sides a little concave. Spine not close to outer tooth, not much stouter at base than the bristles, long and slenderly acuminate, nearly straight. Sides of anterior portion rounding out a considerable distance from the outer tooth in a direction but little caudad of directly ectad before extending caudad at the usual angle (Plate 7, fig. 6). Distance between chitinous spots only twice or slightly less times width at level of bottom of sinus; $3\frac{1}{3}$ times the dental line.

First dorsal plate 1.7 times wider than long; caudal corners widely rounded; sides but little diverging cephalad. Caudal margins of ninth and eleventh plates bent forwards at ends, that of the ninth the more strongly so. Thirteenth plate with the caudal margin curving caudad at ends, the corners being slightly extended.

Coxal pores in type 4, 4, 4, 4.

Ventral spines of first and second legs 0, 0, 1, 3, 1. Spines of second to fourth legs, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the fifth, $\frac{0, 0, 3, 2, 2}{0, 0, 1, 3, 2}$; of the sixth to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 2}{0, 0, 2, 3, 2}$ or on one side, $\frac{0, 0, 3, 1, 2}{0, 0, 2, 3, 3}$; of the thirteenth, $\frac{0, 0, 3, 1, 1}{0, 1, 3, 3, \frac{1}{2}}$; others lost in types. Only last pair of coxae in types laterally armed.

Claw of female gonopods large, well curved, concave, entire. Inner side of first article straight. Basal spines long and slender, with the outer but little the longer; outer spine of nearly uniform width from base to the short acutely pointed apical portion. Process of sternite acutely pointed.

Length 10 to 12 mm.

Type.— M. C. Z., No. 353, Oregon: Portland, 3 August, 1902. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 439, Oregon: Portland, 3 August, 1902. R. V. Chamberlin.

Arebius (Pagobius) kochii (Stuxberg).

Plate 5, fig. 6; Plate 6, fig. 1–3.

Lithobius kochii Stuxberg, Öfvers. K. vet.-akad. Förhandl., 1875, **32**, no. 2. p. 68; Ann. mag. nat. hist., 1875, ser. 4, **15**, p. 190. Chamberlin (in part), Ann. Ent. soc. Amer., 1909, **2**, p. 187; Pomona college journ. ent., 1910, **2**, p. 371, 374; Can. ent., 1911, **43**, p. 380.

Lithobius (*Archilithobius*) *kochii* Stuxberg, Öfvers. K. vet.-akad. Forhandl., 1875, **32**, no. 3, p. 18, 30; Proc. Cal. acad. sci., 1877, **7**, p. 138.

Non *Lithobius kochii* Bollman, Proc. U. S. N. M., 1887, **10**, p. 254, 255; 1889, **11**, p. 348.

Diagnosis.— First dorsal plate 1.8 times wider than long; head a little wider than long. Testaceous to chestnut, frontal region of head paler. Ocelli about ten in three series. Prosternum 1.6 + times wider than long; distance between chitinous spots 3.8 times dental line. Claw of female gonopods long, bipartite; basal spines attenuated from base, outer a little longer. Coxal pores 2, 2, 2, 2 to 3, 3, 3, 3,

small. Anal leg with two claws. Last two pairs of coxae laterally armed. Third joint of first seven pairs of leg with a single ventral spine. Spines of anal legs, ventral, 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; of thirteenth, ventral, 0, 1, 3, 3, 2; of twelfth, dorsal, 0, 0, 3, 1, 2. Length 7.5 to 11 mm.

Description.— Dorsum testaceous to dark brown, often varying toward chestnut; caudal margin of plates sometimes darkened. Head dilute to dark chestnut with the frontal region paler. Venter pale testaceous or very dilute brown, commonly showing anteriorly a somewhat violaceous tinge, while the caudal plates are darker as usual, burnt brown. Legs nearly like corresponding plates of venter; last pair brown above, paler distally and ventrally.

Body strongly narrowed cephalad with head rather small and first plate narrower than third, the widths of head and of first, third, eighth, tenth, and twelfth plates being to each other nearly as 28 : 26 : 28 : 34 : 34 : 33. Body typically about eight times wider than long.

Head suborbicular, the sides being considerably convex; caudal margin mesally nearly straight. A little wider than long (29 : 28).

Antennae very short, reaching only to the fifth segment of body. The twenty articles short and cylindric, rather uniform in proportions.

Ocelli most frequently about ten in three series: *e. g.*, 1 + 4, 3, 2. Decreasing in size cephalad and ventrad. Single ocellus typically much larger than any other, well differentiated (Plate 6, fig. 1).

Prosternum (Plate 5, fig. 6) 1.63 times wider than long. Distance between chitinous spots $2\frac{1}{3}$ times the width at level of bottom of sinus; 3.8 times the dental line. Median sinus v-shaped with the sides straight; shallow, scarcely or not at all extending below level of chitinous dental plate. Teeth small with sides nearly straight, the inner a little larger than the outer and the line of apices but slightly recurved. Spine stout at base, narrowing to bristle-like form distally as usual.

First dorsal plate 1.8 times wider than long; sides moderately convex and converging caudad, widest a little back of the anterior end. Minor plates mostly simply rounded at caudal corners, not obliquely truncate or excised.

Coxal pores small: 2, 2, 2, 2; 2, 3, 3, 2; 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$; of the fourth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$; of the fifth to seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$; of the eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ or

$\frac{0,0,3,2,2}{0,0,2,3,2}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, with two claws. Coxae of last two pairs of legs laterally armed but the spines, especially of the penult pair, easily lost off and coxae so appearing unarmed.

Posterior legs short and moderately slender in female, being a little, uniformly, thickened. In male as in female without special lobes or furrows.

Gonopods of male short and rather wide; distal edge straight, bearing two bristles.

Claw of gonopods of female (Plate **6**, fig. 3) rather long and strongly curved; bipartite, the inner or dorsal lateral lobe being wholly obliterated, the ventral lateral lobe much smaller than the main one, both acute (Plate **6**, fig. 2). Basal spines attenuated more or less uniformly from base to apex, the outer a little the larger.

Length from 7.5 to 11 mm. A male 10 mm. long has antennae 3.6 mm. and anal leg 3.25 mm. long, with the tenth dorsal plate 1.24 mm. wide.

Type Locality.— California: Sausalito.

Topotypes.— M. C. Z., No. 344, 437, California: Sausalito. R. V. Chamberlin.

Also taken in California at Monterey and Pacific Grove, R. V. Chamberlin, and at Ukiah, Oregon.

Arebius (Pagobius) diplonyx, sp. nov.

Plate **5**, fig. 5; Plate **6**, fig. 7, 8.

Diagnosis.— Dorsal plate 1.54 to 1.58 times wider than long; head equal in length and breadth. Brown, first one and last several plates darker, head chestnut. Ocelli eight to ten in three series. Prosternum 1.5 to 1.58 times wider than long; distance between chitinous spots 3.53 to 3.8 times the dental line; sinus v-shaped, opening wide. Claw of female gonopods tripartite with median lobe much the longest; spines subcylindric. Coxal pores 2, 2, 2, 2 to 2, 3, 3, 3. Anal leg with two claws. Last two pairs of coxae laterally armed. Third joint of first seven pairs of legs with single ventral spine. Spines of anal legs, ventral, 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; of thirteenth, ventral, 0, 1, 3, 3, 2 or 0, 1, 2, 3, 2; of twelfth, dorsal, 0, 0, 3, 2, 2 or 0, 0, 3, 1, 2. Length 8.5 to 10 mm.

DESCRIPTION.— Dorsum brown, with the first one and the last several plates commonly darker, more or less chestnut. Head chestnut, nearly uniform or but slightly paler in front of the suture. Antennae usually dark brown or chestnut like the head in individuals in full color, with the ultimate article alone or sometimes with more of the distal portion paler; in some the antennae are lighter throughout. Venter pale brown to almost colorless, sometimes suffused with purplish and at others having a greenish tinge, the posterior plates a denser, clearer brown. Prosternum testaceous and brown to chestnut, the prehensors paler, especially distally. Legs pale, with the tarsi more pigmented; the posterior pairs brownish, brighter testaceous or yellowish distally.

Body mostly from 7.5 to 8.5 times longer than width of tenth plate; but one female 9 mm. long is but 6.4 times longer than the width of this plate. Body conspicuously narrowed cephalad with first plate clearly narrower than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates in a female measured are to each other as 60 : 54 : 60 : 70 : 72 : 68, and in a male as 55 : 50 : 54 : 65: 64 : 60.

Head precisely equal in length and breadth. Widest just back of eyes; sides considerably converging from the marginal breaks caudad.

Antennae short. Composed of from twenty to twenty-three articles which are of moderate length or short and subcylindric in form, not closely compacted. When the number of articles is above the usual twenty, this is due to subdivision of some of those immediately preceding the ultimate which are, as a result, very short. Ultimate article normally but slightly longer than the two preceding taken together.

Each eye consisting usually of from eight to ten ocelli arranged in three series: *e. g.*, 1 + 4, 3, 2, the most frequent arrangement and number; 1 + 4, 3, 1; 1 + 3, 3, 1. Single ocellus distinctly largest, it and the first one of the most dorsal series commonly of a distinct color cast.

Prosternum 1.5 to 1.58 times wider than long. Distance between chitinous spots 2.4 to 2.65 times width at level of bottom of sinus; 3.53 to 3.8 times the dental line. Sinus v-shaped with the opening wide. Teeth small, uniform, well separated with the interval widely semicircular; line of apices nearly straight. Spine long, stout at base and slender distally as usual.

First dorsal plate 1.54 to 1.58 times wider than long. Caudal margins of ninth, eleventh, and thirteenth dorsal plates straight, with

the corners rectangular or narrowly rounded, not at all obliquely truncate.

Coxal pores 2, 2, 2, 2 to 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,2,1}$ or $\frac{0,0,2,1,1}{0,0,1,3,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,3,1}$; of the third, $\frac{0,0,2,2,1}{0,0,1,3,1}$ or $\frac{0,0,2,2,2}{0,0,1,3,1}$; of the fourth and fifth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,3,1}$; of the sixth, $\frac{0,0,3,2,2}{0,0,1,2,1}$ or $\frac{0,0,3,2,2}{0,0,1,3,1}$; of the seventh, $\frac{0,0,2,2,2}{0,0,1,3,1}$; of the eighth, $\frac{0,0,3,2,2}{0,0,1,3,1}$ or $\frac{0,0,3,2,2}{0,0,2,3,1}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,1,2,3,2}$, the spines of the trochanter small or minute; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$ or $\frac{1,0,3,1,0}{0,1,3,2,1}$, claws two with the accessory one moderately large and distinct. Last two pairs of coxae laterally armed.

Gonopod of male very slightly protruding, bearing apparently but one bristle.

Claw of female gonopods strongly curved and concave mesally; tripartite, with the median lobe much largest and the outer tooth often inconspicuous (Plate 6, fig. 8). Spines subcylindric, but slightly narrowed from the base to the acuminate distal portion which is moderate (Plate 6, fig. 7).

Length from 8.5 to 10 mm.

Type.— M. C. Z., No. 342, California: Santa Barbara. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 341, 434–436, California: Santa Barbara. R. V. Chamberlin.

A considerable number of specimens of this species were collected by the author in March, 1913.

Arebius (Pagobius) dolius, sp. nov.

Plate 6, fig. 4–6.

Diagnosis.— Body strongly narrowed cephalad. First dorsal plate 1.55 to 1.6 times wider than long; head longer than wide. Dorsum brown, darker at ends, head chestnut. Ocelli seven to nine, mostly in two series. Prosternum about 1.5 times wider than long; distance between chitinous spots 3.8 times dental line. Claw of female gonopods bipartite; basal spines narrowed from base, outer one considerably larger. Coxal pores 3, 3, 3, 3 to 3, 4, 4, 3. Anal leg with claw single. Last two pairs of coxae laterally armed. Third

joint of first eight pairs of legs with single ventral spine. Spines of anal legs, ventral, 0, 1, 3, 2, 1; of thirteenth legs, ventral, 0, 0, 3, 3, 2; of twelfth, dorsal, 1, 0, 3, 1, 1. Length 9–11 mm.

Description.— Brown, with the first and one or more of caudal plates sometimes darker, more or less of chestnut tinge. Head chestnut, often dusky, paler in front of suture. Antennae brown to chestnut, lighter at tips. Prosternum chestnut like the head, with the prehensors somewhat lighter. Venter much lighter than dorsum, dilute brown of frequently greyish cast; caudal plates darker as usual. Posterior legs darkest, brownish, lighter at tips but not clear yellow.

Body strongly narrowed cephalad with the head comparatively small, the widths of head and of first, third, eighth, tenth, and twelfth plates being to each other, in a male, as 54 : 52 : 57 : 65 : 68 : 68 : 65 and in a female as 52 : 51 : 57 : 67 : 69 : 69.

Head longer than wide, typically in about ratio 54 : 52.

Antennae short; the twenty articles short, decreasing gradually distad from the second. The ultimate article normally distinctly longer than the two preceding ones together.

Each eye commonly composed of from seven to nine ocelli in two series: *e. g.*, 1 + 4, 3; 1 + 5, 3; 1 + 4, 2. Single ocellus (Plate **6**, fig. 5) always distinctly much larger than any other, the first of the dorsal series being next in size and the others decreasing cephalad.

Prosternum 1.5— times wider than long. Distance between chitinous spots 2.8 times width at bottom of median sinus and 3.8 times the dental line. Teeth rather small and acute; the line of apices distinctly recurved. Sinus strictly v-shaped. Spine much stouter than the bristles and acutely acuminate but ordinarily not strictly bristle-like at tip.

First dorsal plate with sides moderately converging caudad to the rounded corners; 1.55 or 1.6 times wider than long. Minor plates with caudal corners simply rounded, not obliquely truly truncate.

Coxal pores small: 3, 3, 3, 3; 3, 3, 4, 3; 3, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the second to fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 1}$; of the sixth to eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the ninth to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$ or $\frac{1, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, with the claw single. Last two pairs of coxae laterally armed.

Claw of female gonopods bipartite, with the inner or more dorsal lobe much smaller than and much below apex of the main one, the outer lobe being wholly obliterated (Plate **6**, fig. 6). Basal spines

distinctly narrowing from the base distad, the apical portion more abruptly acute; sometimes the sides are somewhat incurved toward middle of length; outer spine stouter and considerably longer than the inner (Plate 6, fig. 4).

Length from 9 to 11 mm.

Type.— M. C. Z., No. 343, California; Friant, March, 1913. R. V. and S. C. Chamberlin.

Paratypes.— M. C. Z., No. 431, California: Santa Barbara, R. V. Chamberlin; M. C. Z., No. 432, 433, 450, Friant, March, 1913, R. V. and S. C. Chamberlin.

Nothembius, gen. nov.

Head with lateral marginal interruptions.

Antennae short; composed normally of twenty-two articles, or in some individuals of but twenty-one.

Eyes composed of ocelli in two or three series; single ocellus differentiated and enlarged.

Prosternal teeth 2 + 2 or 3 + 3; line of apices, more or less recurved; sinus v-shaped; spine slender, distally bristle-like.

Posterior corners of ninth dorsal plate rounded; of eleventh straight or slightly rounded; and of thirteenth produced.

Claw of female gonopods large; entire. Basal spines 2 + 2 or 2 + 3; stout, attenuated distad, with the outer of each pair considerably exceeding the inner.

Tarsi of the anterior legs with a division more or less clearly indicated, the suture being mostly complete or nearly so.

Anal and penult legs of male moderately thickened, the fifth joint of the former bearing on its ventral surface at distal end a more or less conspicuous pilose lobe. Last one or two pairs of coxae laterally armed. Either all legs or all excepting the first one to first five pairs with the third joint bearing three dorsal spines and either two or three ventral ones; fifth joint of legs from first to twelfth, or all of these excepting the first one or two pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral in female, 1, 3, 2, 1 and in a male either 1, 3, 2, 0 or 1, 3, 2, 1; claw one. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2 or in individual exceptions 0, 1, 3, 3, 1; claws three. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 or 1, 0, 3, 1, 2; ventral, 0, 1, 3, 3, 2 or in exceptional individuals, 0, 0, 3, 3, 2. Dorsal spines of twelfth legs 1, 0, 3, 1, 2 or 0, 0, 3, 1, 2 to

Fig. 5.— Distribution of Nothembius.

0, 0, 3, 1, 2 or 0, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2. Dorsal spines of eleventh legs 0, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2 or 0, 0, 2, 3, 2. Dorsal spines of first legs mostly 3, 2, 1 or 2, 2, 1, in individual exceptions sometimes only 2, 1, 1; ventral nearly always 0, 0, 2, 3, 2, occasionally 0, 0, 2, 3, 1 or 0, 0, 2, 2, 1.

Length between 8.5 and 13.5 mm.

Type.— *N. insulae*, sp. nov.

Three species of this interesting genus occur in California. They may be separated as follows.

Key to Species of Nothembius.

a. Prosternal teeth 3 + 3; ventral spines of anal legs in both ♂ and in ♀, 0, 1, 3, 2, 1.....*N. aberrans*, sp. nov.

aa. Prosternal teeth 2 + 2; ventral spines of anal legs in ♂, 0, 1, 3, 2, 0, and ♀ 0, 1, 3, 2, 1.

b. Dorsal spines of third joint of first four to six pairs of legs only two in number; body typically 8.5 or more times longer than width of the tenth plate....*N. insulae*, sp. nov.

bb. Dorsal spines of third joint of all legs three in number or of the first alone rarely only two; body mostly only between seven and eight times longer than width of tenth plate. *N. nampus*, sp. nov.

Nothembius insulae, sp. nov.

Plate 8, fig. 6; Plate 9, fig. 1–3.

Diagnosis.— Slender; first dorsal plate 1.7 times wider than long; head wider than long. Dorsum brown to chestnut, head and first dorsal plate darker. Ocelli six to eight in two or three series. Prosternum 1.6 times wider than long; distance between chitinous spots 3.6 times dental line; teeth, 2 + 2. Basal spines of gonopods acuminate from base. Coxal pores 3, 3, 3, 3 to 3, 4, 4, 3. Third joint of first four or five pairs of legs with but two dorsal spines. Last one or two pairs of coxae laterally armed. Spines of anal legs, ventral, in female 0, 1, 3, 2, 1, in male 0, 1, 3, 2, 0; of thirteenth, dorsal, 1, 0, 3, 1, 1; of twelfth, dorsal, 1, 0, 3, 1, 2 or 1, 0, 3, 1, 1. Lobe of anal leg of male as in Plate 9, fig. 1. Length 10 to 13.5 mm.

Description.— Dorsum brown to chestnut, typically the latter. Head and usually with it the first dorsal plate a little darker than the

dorsum of body with the region in front of suture usually paler and in some a black spot just back of the suture. Antennae chestnut, rufous distally. Prosternum dusky brown; prehensors testaceous. Venter brown, the caudal plates darker and more reddish as usual. Legs brown like the venter, the tarsi lighter, testaceous; posterior pairs more chestnut, the tarsi, or tibiae and tarsi, commonly lighter, testaceous.

Body usually 8.5 or more times longer than width of tenth plate; Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 67 : 63 : 71 : 82 : 84 : 78.

Head suborbicular; wider than long in about ratio 67 : 63.

Antennae short and strongly attenuated. Articles short, uniform, very regularly decreasing distad; twenty-two in number.

Ocelli six to eight in two or three series: *e. g.*, 1 + 3, 2; 1 + 4, 3; 1 + 3, 2, 1; 1 + 4, 2, 1. Single ocellus greatly exceeding in size the others, which are mostly small; first ocellus of uppermost row clearly the largest of the seriate ocelli, often paler than the others which decrease cephalad.

Prosternum (Plate **9**, fig. 3) 1.6 times wider than long. Distance between chitinous spots 2.26 times width at level of bottom of sinus; 3.6 times length of dental line. Sides of anterior portion rounding out well from ectal teeth. Line of apices of teeth nearly straight. Sinus large, v-shaped; distance between mesal teeth somewhat greater than that between teeth of each pair.

First dorsal plate near 1.7 times wider than long.

Coxal pores 3, 3, 3, 3; 3, 3, 4, 3; 3, 4, 4, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,2,3,2}$ or $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the second to fourth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fourth to fifth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the sixth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$ or $\frac{1,0,3,1,2}{0,0,3,3,2}$, where the latter the anterior dorsal spine of tibia very small; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$ (♀) or $\frac{1,0,3,1,0}{0,1,3,2,0}$ (♂); claw one. Either last pair or last two pairs of coxae laterally armed; when the last two the spine on penult coxa is very small.

Anal legs of male with the fifth joint thickened and at distal end ventromesally excised and on plane of excision bearing an oblong lobe, the longitudinal axis of which is a little oblique to that of joint; the lobe expands distally above base and is flat or somewhat concave topped (Plate **9**, fig. 1).

Claw of female gonopods large, well curved, moderately excavated. Spines acuminate from base gradually to distal division and then more

abruptly acutely pointed. Outer spine always considerably longer than the inner (Plate 8, fig. 6). Mesal edge of first article diverging from the median line, proximally somewhat concave (Plate 9, fig. 2).

Length 10 to 13.5 mm.

Praematurus.— Color of dorsum decidedly green. Head and first plate light brown. Antennae light brownish, lighter distad. Prosternum like head. Venter green. Legs pale green, lighter, freer from green, distad; posterior pairs brighter, yellowish.

Articles of antennae already twenty-one or twenty-two.

Ocelli five in two series: 1 + 3, 2. Single ocellus largest, pale; first of upper series next in size, also pale.

General form and proportion of prosternum as in adult. Sinus between v- and u-shaped, large. Line of apices of teeth slightly recurved.

Coxal pores 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,1}$; of the third, $\frac{0,0,2,2,2}{0,0,2,3,1}$; of the fourth to sixth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the seventh to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,2}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$ (♀), or $\frac{1,0,3,1,0}{0,1,3,2,0}$ (♂). Last pair of coxae laterally armed.

Anal legs in male slender, the fifth joint not much thickened but showing at the distal end the lobe which may have nearly the characteristic form excepting for smaller size or which may appear in the form of merely a rounded, bulging eminence or knob not yet showing the characteristic shape.

Claw of female gonopods moderately curved, rather stout, strictly entire. Basal spines two *plus* two, but the inner spine of each pair very much smaller, both spines acutely conical. Second and third articles each with three ventral bristles, the first with three or four.

Length cir. 8.25–8.5 mm.

Immaturus.— Prevailingly green. Head and first plate same as dorsum or brownish with frontal paler. Antennae paler distad of middle. In green individuals the legs are somewhat whitish distad.

Antennae with full number of articles, twenty-two.

Ocelli 1 + 2, 2. Well separated; slightly pigmented. Single ocellus and the caudal one of each series not much differing in size.

Prosternum with same form and proportions as in adult.

Coxal pores very small, 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the second, $\frac{0,0,2,2,1}{0,0,0,1,1}$; of the third to fifth, $\frac{0,0,2,2,2}{0,0,1,1,1}$; of the sixth and seventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the eighth

and ninth, $\frac{0,0,2,2,2}{0,0,1,3,1}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,3,1}$ or $\frac{0,0,3,2,2}{0,0,1,3,2}$; of the eleventh, $\frac{0,0,3,1,2}{0,0,1,2,1}$; of the twelfth, $\frac{0,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{0,0,3,1,1}{0,0,2,2,2}$ to $\frac{0,0,3,1,1}{0,0,3,3,2}$; of the penult, $\frac{0,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$ (♀) or $\frac{1,0,3,1,0}{0,1,3,2,0}$ (♂). No lateral spines detected on any of the coxae.

Length cir. 7.5 mm.

Agenitalis I.— Color very dilute brown, with head and first dorsal plate a little darker. Legs pale, whitish.

Antennae composed of twenty articles which are short and closely compacted, the ultimate being longer than the three preceding ones taken together.

Ocelli 1 + 2, 1 or 1 + 2, 2. Single ocellus and caudal one of upper series equal or single one rather smaller.

Prosternum nearly as in older stages.

Coxal pores very small, 2, 1, 1, 1.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$ or $\frac{0,0,0,1,0}{0,0,1,1,1}$, the ventral spine of third joint being minute; of the second, $\frac{0,0,0,2,1}{0,0,1,1,1}$ or $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the fourth, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the fifth to ninth, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the tenth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ to $\frac{0,0,1,2,2}{0,0,1,3,2}$; of the eleventh, $\frac{0,0,2,1,1}{0,0,2,3,2}$ or $\frac{0,0,2,1,1}{0,0,1,3,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,3,2}$ or $\frac{0,0,2,1,1}{0,0,1,2,2}$; of the thirteenth and penult, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the anal, $\frac{0,0,0,0,0}{0,0,1,1,0}$. Posterior coxae with neither bristles nor spines.

Female gonopods elongate; conical; biarticulate; with no trace of claw or spines.

Anal glands still present in fully developed form.

Length cir. 6.4 mm.

Pullus IV (*Larva quarta*).— Very pale, dilute yellowish. Head more pigmented, somewhat orange.

Antennae composed of seventeen articles.

Ocelli 1 + 2, 1. Caudal ocellus of upper series and that of the lower larger than the single ocellus; anterior one small. All distinct and well separated.

Prosternum with line of apices of teeth recurved. Sinus proportionately somewhat smaller than in the adult.

Each twelfth coxa with a single pore.

Twelve developed pairs of legs present, the other three pairs appearing as slender appressed buds.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,1,1}$ or $\frac{0,0,0,0,1}{0,0,1,1,1}$; of the second, $\frac{0,0,0,0,1}{0,0,1,1,1}$; of the third, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the fourth to eighth, $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the ninth, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the tenth to twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$.

Anal glands well developed.

Length *circa* 6 mm.

TYPE.— M. C. Z., No. 429, California: Santa Cruz Island, La Playa Canyon. R. V. Chamberlin.

PARATYPES.— M. C. Z., No. 359–364, 427, 428, California: Santa Cruz Island, La Playa Canyon. R. V. Chamberlin.

This species is very close to *N. nampus* but the differences appear clearly and definitely upon close study. It is a more slender species with a proportionately smaller head, being 8.5 or more times longer than width of the tenth plate whereas the ratio in *N. nampus* is usually between seven and eight or but slightly more, to one. The prosternum is proportionately narrower. It is a distinctly more reddish species, being normally chestnut in the adult. The spines of the female gonopods are somewhat more slender and are more uniformly and acutely acuminate. Finally, the first four or five pairs of legs have the third joint with but two dorsal spines as against three in *N. nampus* on all or on all but the first pair. There appears to be a difference in habitat, *N. insulae* having been found only in the cooler, moister portions of La Playa Canyon on Santa Cruz Island, where *N. nampus* occurs on the hills and in the more open places as it does on the mainland.

NOTHEMBIUS NAMPUS, sp. nov.

Plate 8, fig. 4; Plate 9, fig. 6, 7.

DIAGNOSIS.— Less slender; first dorsal plate near 1.64 times wider than long; head wider than long. Testaceous to brown, head and first dorsal plate light chestnut. Ocelli seven to nine in two or three series. Prosternum 1.66 to 1.68 times wider than long; distance between chitinous spots 3.75 times dental line; sinus shallow and wide; teeth 2 + 2. Basal spines of gonopods less slender (Plate 8, fig. 4). Coxal pores 3, 4, 4, 3. Third joint of all legs, or of all but first pair, with three dorsal spines. Last one or two pairs of coxae laterally armed. Spines of anal legs, ventral, in female 9, 1, 3, 2, 1, in male 0, 1, 3, 2, 0; of thirteenth, dorsal, 1, 0, 3, 1, 1; of twelfth, dorsal, 0, 0, 3, 1, 2. Lobe of anal leg of male as in *N. insulae*. Length 7 to 12 mm.

DESCRIPTION.— Dorsum testaceous to brown, the plates caudad of the middle in most showing a distinct median longitudinal dark stripe which may also sometimes be present on the anterior ones.

Head and usually the first dorsal plate pale chestnut, frontal region paler and on caudal portion a darker median longitudinal stripe. Prosternum mostly light brown, the prehensors paler. Venter yellow to testaceous, with the caudal plates darker, burnt brown. Legs yellowish or testaceous, the posterior pairs more densely pigmented.

Body from 7 to $8\frac{1}{3}$ times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other as 29 : 28 : 29 : 31 : 32 : 30.

Head wider than long. Caudal margin mesally a little incurved. Sides between eyes and lateral breaks characteristically nearly straight and subparallel.

Antennae very short, reaching or not fully attaining the fifth body segment. Articles normally twenty-two, sometimes only twenty-one; short and mostly rather slender; distally shorter ones may occur at intervals between longer ones.

Ocelli seven to nine in two or three series: *e. g.*, 1 + 4, 3, a very common arrangement; 1 + 3, 3; 1 + 4, 2, 1; 1 + 4, 3, 1. Single ocellus largest, the others, excepting most caudal, of small or very small size.

Prosternal teeth 2 + 2; inner one of each pair larger than the outer so that line of apices is commonly almost straight. Sinus shallow and wide, with sides concave. Spine slender and straight. 1.66 to 1.68 times wider than long. Distance between chitinous spots 2.64 times width at level of bottom of sinus; 3.75 times the dental line. Distance between apices of mesal teeth equal to that between apices of teeth of each pair (Plate **9**, fig. 6).

First dorsal plate about 1.64 times wider than long; sides back of about anterior third of length considerably converging and but little convex; caudal corners well rounded. Caudal margin of ninth plate straight; the eleventh and especially the thirteenth plate with the caudal corners obliquely excised, the line of excision straight and making but a slight angle with the median portion of margin.

Coxal pores small, decreasing in size proximad on each coxa in the usual way: 2, 3, 3, 2; 3, 4, 4, 3, the most usual number and arrangement.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the second to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$ (♀) or $\frac{1,0,3,1,0}{0,1,3,2,0}$ (♂). Last two pairs of coxae, or rarely but the last pair, laterally armed.

Anal legs in male short, of uniform thickness. The tibia at its

distal end with mesoventral side obliquely excised and bearing at this place a characteristic oblong lobe set somewhat obliquely to the longitudinal axis of the joint, somewhat expanded above base and distally flattened as in *N. insulae*; bristles of lobe rather few, straight.

Gonopods of male pale; small, rounded and wart-like; bearing one or two bristles.

Claw of female gonopods short and unusually thick and stout; rather strongly curved; strictly entire; distally narrowly acutely rounded. Spines 2 + 2 or 2 + 3, the outer considerably larger than the inner; in ventral view the outer is attenuated from near base, the inner being proportionately broader with the sides parallel from base to an acuminate apical portion (Plate **8**, fig. 4; Plate **9**, fig. 7). Inner side of first article considerably diverging proximad from that of the opposite one, proximally concave.

Length 7 to 12 mm., the female types varying from 9 to 12 mm. and the male types from 7 to 10 mm. in length. A male 9.75 mm. long has antennae 3.5 mm. and anal legs 3.4 mm. long and the tenth plate 1.17 mm. wide.

Type.— M. C. Z., No. 426, California: Claremont. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 420, 424, California: Claremont; M. C. Z., No. 358, 425, Eaton's Canyon; M. C. Z., No. 421–423, Santa Cruz Island. R. V. Chamberlin.

Nothembius aberrans, sp. nov.

Plate **8**, fig. 5; Plate **9**, fig. 4, 5.

Diagnosis.— First dorsal plate near 1.86 times wider than long; head wider than long. Brown, head a little darker and of chestnut cast. Ocelli nine to eleven in three series. Prosternum 1.64 times wider than long; distance between chitinous spots 4 times dental line; teeth 3 + 3. Outer spine longer and stouter than inner. Coxal pores 3, 3, 3, 3 to 4, 4, 4, 3. Third joint of first four or five pairs of legs bearing only two dorsal spines and of first nine only two ventral ones. Last two pairs of coxae laterally armed. Spines of anal legs, ventral, in both sexes 0, 1, 3, 2, 1; of thirteenth legs, dorsal, 1, 0, 3, 1, 2 or, rarely, 1, 0, 3, 1, 1; of twelfth, dorsal, 0, 0, 3, 2, 2 or 0, 0, 3, 1, 2. Lobe of anal leg in male as in Plate **9**, fig. 5. Length 8. 5 to 10 mm.

Description.— Dorsum typically brown. Head a little darker

and of chestnut cast. Antennae dark brown, light at tips. Venter brown. Prosternum darker than venter, of chestnut tinge. Legs pale brown, posterior pairs darker, all legs lighter distally. In some specimens the body is paler throughout and of a greenish tinge, as is often the case in the related species.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 58 : 56 : 60 : 71 : 75 : 73.

Head wider than long in about ratio 58 : 53; widest at level of breaks, widely rounded and but moderately narrowed anteriorly.

Antennae short and well attenuated. Articles twenty-two, short and very short, decreasing distad in the usual way.

Ocelli nine to eleven in three series: *e. g.*, 1 + 4, 3, 2, the commonest arrangement, 1 + 4, 3, 1; 1 + 4, 3, 3. Single ocellus largest; the most caudal one of first and of second series also large, the others decreasing anteriorly.

Prosternum in type 1.64 times wider than long. Distance between chitinous spots 2.35 times width at level of bottom of sinus; four times the dental line. Teeth 3 + 3, all moderately acute and with sides straight, the most mesal on each side smaller than the other two which are subequal, and the interval separating it from the median one of the three shallower and much narrower than that between the outer two. Line of apices recurved. Sinus narrow, narrowly rounded at bottom. Spine as usual (Plate **9**, fig. 4).

First dorsal plate in type about 1.86 times wider than long; widening moderately cephalad. Posterior angles of ninth plate rounded, of the eleventh straight, and of thirteenth distinctly, although but moderately, produced.

Coxal pores 3, 3, 3, 3; 3, 3, 4, 3; 3, 4, 4, 3; 4, 4, 4, 3.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,2,3,1}$ or $\frac{0,0,2,2,1}{0,0,2,2,1}$ (on one side) to $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the second, $\frac{0,0,2,2,2}{0,0,2,3,1}$ or $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the third and fourth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fifth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the sixth to ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,0,3,3,2}$ or $\frac{0,0,3,1,2}{0,0,3,3,2}$; of the thirteenth, $\frac{0,0,3,1,2}{0,1,3,3,2}$, $\frac{0,0,3,1,2}{0,0,3,3,2}$ (on one side), or rarely $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or occasionally, on one side, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, alike in both sexes; claw one. Last two pairs of coxae laterally armed.

Anal and penult legs considerably thickened in both sexes, especially the third, fourth, and fifth joints, the tibiae and tarsi remaining in comparison abruptly more slender. In the male the fifth joint of the

anal leg is less markedly excised at distal end than in the other two species. The lobe borne is comparatively thin, is higher caudally than anteriorly and has the distal or free surface convex; it bears numerous long, distally curved, hairs; the lobe is set somewhat obliquely to the long axis of the joint and is proportionately lower and smaller than in the other species (Plate **9**, fig. 5).

The claw of the female gonopods is long and rather slender, acutely pointed, strongly curved and moderately excavated. The outer spine is distinctly and considerably stouter and longer than the inner; spines narrowed from base to apical portion which in outer spine is acute and in inner is almost obtuse (Plate **8**, fig. 5). Inner edge of first article straight but distinctly diverging from the median line cephalad.

Length 8.5 to 10 mm.

TYPE.— M. C. Z., No. 357, California: Eaton's Canyon, near Altadena. R. V. Chamberlin.

PARATYPES.— M. C. Z., No. 365, 430, California: Eaton's Canyon, near Altadena. R. V. Chamberlin.

This species is readily separated from the two other species in having the prosternal teeth 3 + 3 instead of 2 + 2. The male differs from those species not only distinctly in the character of the lobe borne on the anal leg but also in having the ventral spines of that leg 0, 1, 3, 2, 1 as in the female. In the spining of the legs the species is nearer to *N. insulae* than to *N. nampus*. Typically it differs from both species in having the dorsal spines of the thirteenth legs 1, 0, 3, 1, 2 instead of 1, 0, 3, 1, 1. The posterior legs are proportionately stouter. The single ocellus is less enlarged.

TIGOBIUS, gen. nov.

Head with lateral marginal breaks.

Antennae very short; articles twenty.

Eyes composed of seriate ocelli; single ocellus not enlarged, smaller than one or more of the other ocelli.

Prosternal teeth 2 + 2, the line of apices recurved. Spine slender. Incision rather large, v-shaped.

Posterior angles of none of the dorsal plates produced.

Coxal pores small and circular, uniseriate.

Claw of female gonopods short, tripartite, with median tooth largest. Basal spines 2 + 2 acuminate from base.

FIG. 6.— Distribution of Tigobius.

Tarsi of anterior legs strictly entire, with no trace of division.

Anal and penult legs in male moderately and uniformly crassate. Anal leg with sixth joint bearing at distal end on dorsal side a small but conspicuous process or lobe. Anal coxae laterally armed. Third joint of none of the legs cephalad of the ninth or tenth pair dorsally armed. Fifth joint of legs from second to near eleventh with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0, the claw single. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 1; claws two. Dorsal spines of thirteenth legs 0, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2 or 0, 1, 2, 3, 2. Dorsal spines of twelfth legs 0, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 0, 0, 0, 2, 2 or 0, 0, 1, 2, 2; ventral, 0, 0, 1, 3, 2. Dorsal spines of first legs 0, 0, 0, 1, 1 or 0, 0, 1, 1, 1; ventral, 0, 0, 1, 2, 1.

Length 7 mm. and under.

Type.— *T. paralus,* sp. nov.

The characteristic lobe on the sixth joint of the anal legs much resembles that found on the fifth joint of the penult legs in the males of Nampabius. The genus is at present known from a single species.

Tigobius paralus, sp. nov.

Plate 10, fig. 1–4.

Dorsum brown, lightest at middle. Caudal portion of head similar to dorsum; but anteriorly it is lighter, yellowish or subferruginous. Antennae light yellowish brown. Legs dilute brown, posterior pairs lighter, bright yellow. Venter brown, with caudal plates darker, and anterior ones suffused with violaceous. Prosternum and prehensors somewhat testaceous.

Body attenuated considerably cephalad from tenth plate, the first plate being much narrower than the head and than the third plate. Width of head and of first, third, eighth, tenth and twelfth plates to each other as 37 : 34.5 : 37 : 42 : 43 : 41.

Head varying in proportions from nearly equal in length and breadth (♀ paratype) to considerably longer than wide (41 : 37 in ♂ paratype). Sides substraight and but slightly converging caudad between eyes and caudal corners. Lateral marginal breaks slight.

Antennae very short. Articles between third and ultimate very short. Ultimate article longer than the two preceding taken together.

Ocelli 1 + 4 and 1 + 1, 3. Single ocellus somewhat smaller than

the first of series (Plate **10**, fig. 2). Ocelli pale. Organ of Tömösvary circular in outline, larger than the adjacent ocelli.

Prosternum (Plate **10**, fig. 3) strongly narrowed anteriorly, with sides of anterior portion incurving. Teeth low, angularly pointed, with line of apices distinctly recurved. Incision proportionately rather large, v-shaped, with sides a little concave. Spine slenderly acuminate, bending a little mesad. In type 1.42+ times wider than long. Distance between chitinous spots 2.23 times width at level of bottom of incision; 3.625 times as great as length of dental line.

First dorsal plate widest at or a little in front of the middle, widely rounded caudad from a little back of middle to and about the caudal corners; 1.7 times wider than long. Sixth, seventh, and ninth plates with the caudal corners excised, the line of excision or truncation being long; eleventh plate with caudal corners only shortly excised; fourth and thirteenth with caudal margins straight.

Coxal pores very small: 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,2,1}$ or $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,0,2,2}{0,0,1,2,1}$ or $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the third, $\frac{0,0,0,2,2}{0,0,1,2,1}$; of the fourth, $\frac{0,0,0,2,2}{0,0,1,2,1}$ or $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the fifth to eighth, $\frac{0,0,0,2,2}{0,0,0,2,1}$; of the ninth, $\frac{0,0,0,2,2}{0,0,1,2,1}$; of the tenth, $\frac{0,0,0,2,2}{0,0,1,3,2}$, $\frac{0,0,1,2,2}{0,0,1,3,2}$ or $\frac{0,0,0,2,2}{0,0,1,3,1}$; of the eleventh, $\frac{0,0,0,2,2}{0,0,1,3,2}$, $\frac{0,0,1,2,2}{0,0,1,3,2}$, or $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{0,0,2,1,1}{0,0,2,3,2}$ or (on one side), $\frac{0,0,2,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw single. Anal coxae alone laterally armed.

Anal and penult legs of male moderately and uniformly crassate. Penult not otherwise modified but sixth joint of anal leg bearing on dorsal surface at distal end a small but conspicuous subcylindric process very similar to that occurring on tibia of penult legs in species of Nampabius (Plate **10**, fig. 1).

Gonopods of male well exposed, sides subparallel and distal edge substraight; each bearing a single bristle.

Claw of female gonopods moderately short, but little curved, tripartite, with median tooth considerably largest and the lateral ones subequal. Spines acutely acuminate from base to apex; the outer longer than the inner (Plate **10**, fig. 4).

Length from 5 to 7 mm.

Type.— M. C. Z., No. 366, California: Pacific Grove. R. V. Chamberlin.

Paratypes.— M. C. Z., No. 367, California: Pacific Grove; M. C. Z., No. 368, 452, Santa Barbara; M. C. Z., No. 451, 453, Santa Cruz Island. R. V. Chamberlin.

PLATE 1.

PLATE 1.

Oabius patonius (Chamberlin). (Mill Valley).

Fig. 1. Last three legs of right side, dorsal view.
Fig. 2. Anterior view of distal portion of the seventh left leg, showing the undivided tarsus.
Fig. 3. Anterior portion of prosternum showing teeth, spines, sinus, etc.
Fig. 4. Right eye, showing arrangement and form of ocelli. Organ of Tömösvary appears in outline at the right and below.

Oabius patonius flavus Chamberlin. (Santa Barbara).

Fig. 5. Right eye and organ of Tömösvary (same scale as for fig. 4).

Oabius pylorus Chamberlin. (Capitola).

Fig. 6. Right eye and organ of Tömösvary (same scale as for fig. 4).

Oabius tiganus (Chamberlin). (Pacific Grove).

Fig. 7. Right eye and organ of Tömösvary (same scale as for fig. 4).

Oabius fratris Chamberlin. (Friant).

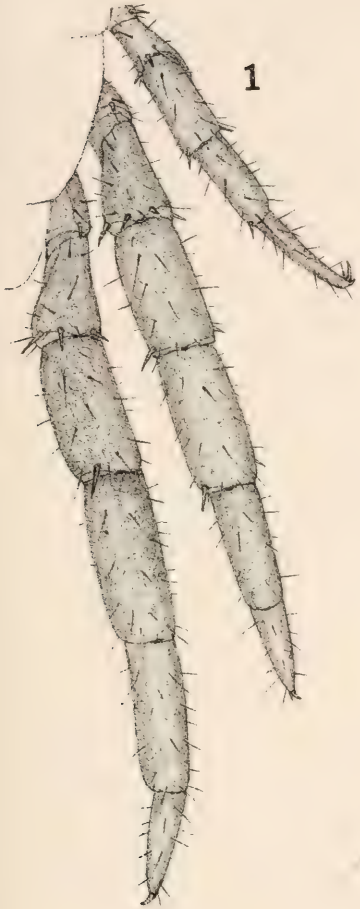
Fig. 8. Right eye and organ of Tömösvary (same scale as for fig. 4).

Oabius tabiphilus Chamberlin. (Santa Barbara).

Fig. 9. Right eye and organ of Tömösvary (same scale as for fig. 4).

Oabius patonius micrus Chamberlin. (Pacific Grove).

Fig. 10. Anterior portion of prosternum.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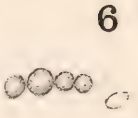
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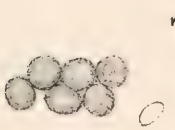
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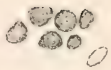
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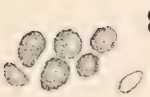
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PLATE 2.

PLATE 2.

Oabius pylorus Chamberlin. (Capitola).

Fig. 1. Claw of right gonopod of female, ventral view.
Fig. 2. Basal spines of right gonopod of female, more highly magnified.

Oabius (*Nyctobius*) *ineptus* Chamberlin. (Portland).

Fig. 3. Claw of left gonopod of female (same magnification as for fig. 1).
Fig. 4. Basal spines of left gonopod of female (same scale as for fig. 2).

Oabius tiganus (Chamberlin). (Pacific Grove).

Fig. 5. Basal spines of left gonopod of female, showing also straight mesal edge of proximal article (same scale as for fig. 2).

Oabius patonius micrus Chamberlin. (Pacific Grove).

Fig. 6. Basal spines of left gonopod of female (same scale as for fig. 2).

Oabius patonius flavus Chamberlin. (Santa Barbara).

Fig. 7. Basal spines of left gonopod of female (same scale as for fig. 2).

Oabius tabiphilus Chamberlin. (Santa Barbara).

Fig. 8. Basal spines of left gonopod of female (same scale as for fig. 2).

Oabius uleorus Chamberlin. (Forrester Island).

Fig. 9. Basal spines of left gonopod of female (same scale as for fig. 2).

Oabius fratris Chamberlin. (Friant).

Fig. 10. Basal spines of left gonopod of female (same scale as for fig. 2).

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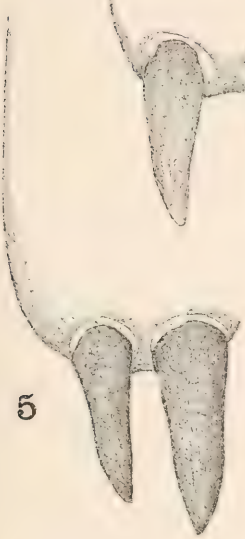
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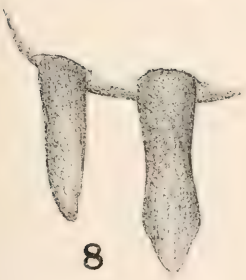
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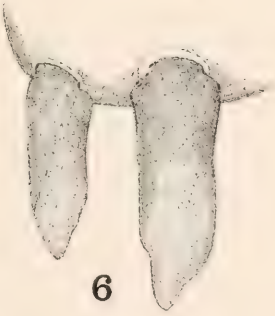
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PLATE 3.

PLATE 3.

Oabius dissimulans Chamberlin.

Fig. 1. Basal spines of left gonopod of female from Brookdale (same scale as for Plate **2**, fig. 2).

Fig. 2. Basal spines of left gonopod of female from Santa Barbara.

Fig. 3. Basal spines of left gonopod of female from Sausalito.

Oabius (*Nyctobius*) *ineptus* Chamberlin. (Portland).

Fig. 4. Basal spines of left gonopod of female.

Oabius (*Nyctobius*) *decipiens* Chamberlin. (Pacific Grove).

Fig. 5. Basal spines of left gonopod of female.

Paobius boreus Chamberlin. (Forrester Island).

Fig. 7. Ocelli of left eye. Organ of Tömösvary not represented (same scale as for Plate **1**, fig. 4).

Fig. 8. Anterior portion of prosternum.

Fig. 9. Second leg of right side, anterior view, showing line separating the two parts of tarsus.

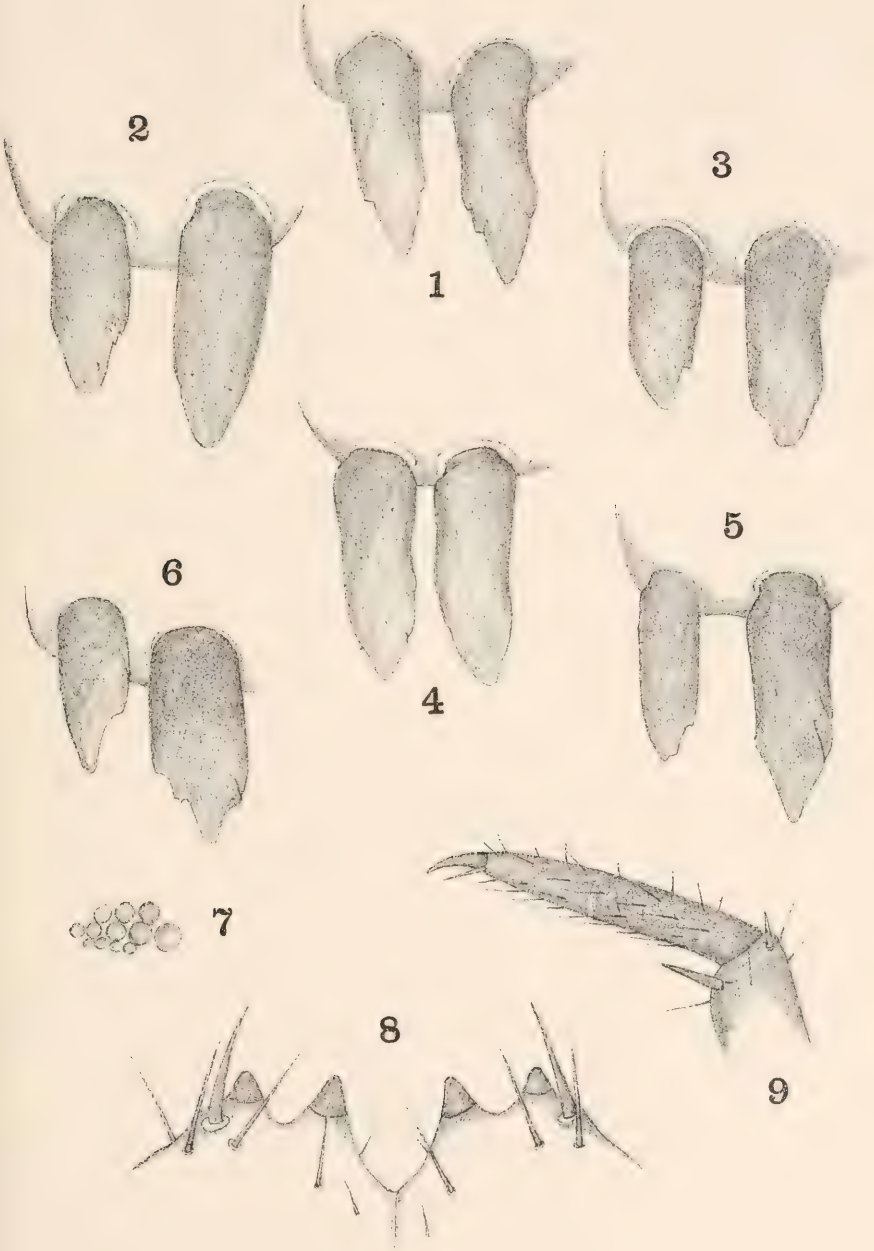
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PLATE 4.

PLATE 4.

Paobius boreus Chamberlin. (Forrester Island).

Fig. 1. Claw of left gonopod of female, ventral view.
Fig. 2. Basal spines of right gonopod of female more highly magnified (same scale as for Plate **3**, fig. 1).
Fig. 3. Head in outline, showing character of margin.

Paobius columbiensis Chamberlin. (Kaslo).

Fig. 4. Basal spines of right gonopod of female (same scale as for fig. 2).

Kiberbius ogmopus Chamberlin. (Eaton's Canyon).

Fig. 5. Head in outline.
Fig. 6. Anterior portion of prosternum.

Kiberbius nannus Chamberlin. (Eaton's Canyon).

Fig. 7. Head in outline (same scale as for fig. 5).

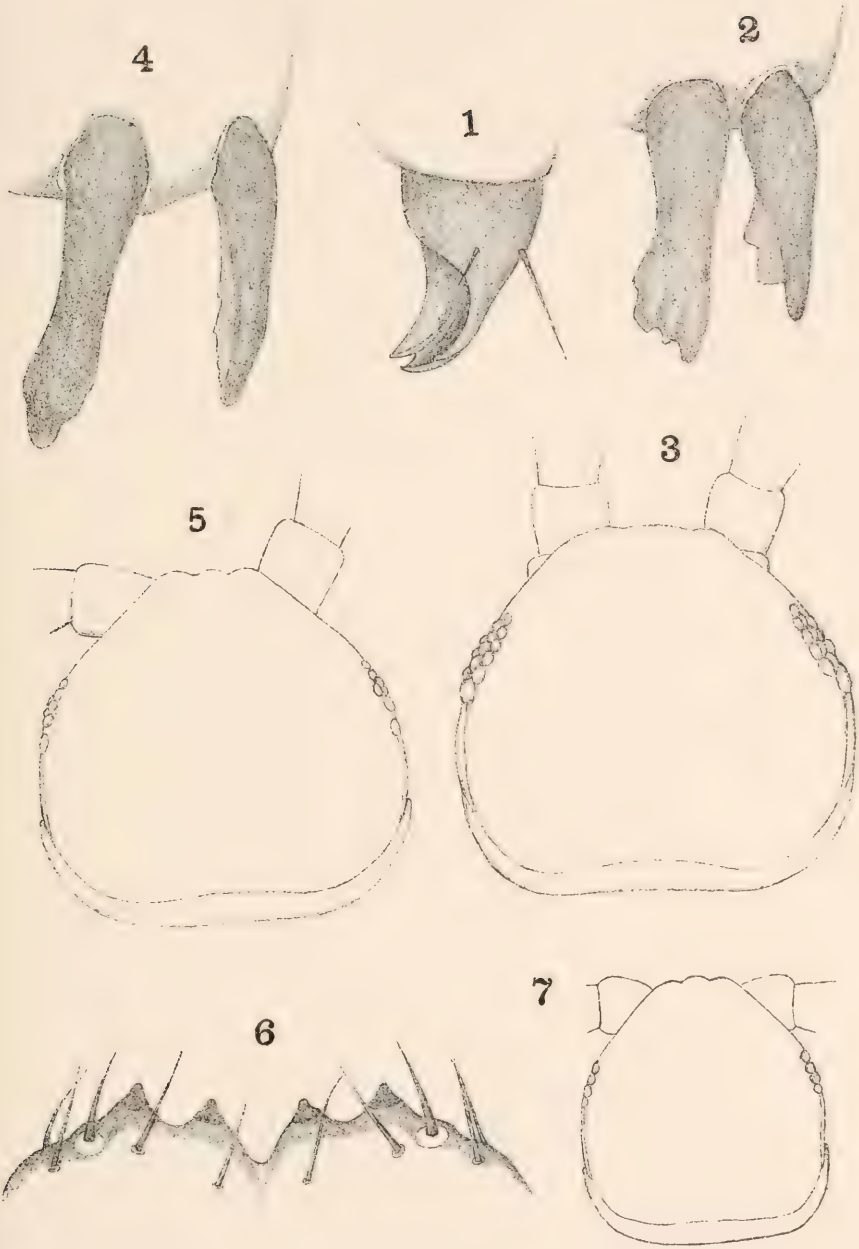
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PLATE 5.

PLATE 5.

Kiberbius ogmopus Chamberlin. (Eaton's Canyon).

Fig. 1. Right anal leg of female, ventral view, showing the characteristic furrowing.

Fig. 2. Seventh left leg, anterior view, showing demarcation of two parts of tarsus.

Fig. 3. Basal spines of left gonopod of female (same scale as for Plate **3**, fig. 1).

Kiberbius nannus Chamberlin. (Eaton's Canyon).

Fig. 4. Basal spines of left gonopod of female (same scale as for fig. 3).

Arebius (*Pagobius*) *diplonyx* Chamberlin. (Santa Barbara).

Fig. 5. Distal portion of fourth leg on left side, showing structure of tarsus.

Arebius (*Pagobius*) *kochii* (Stuxberg). (Sausalito).

Fig. 6. Anterior portion of prosternum.

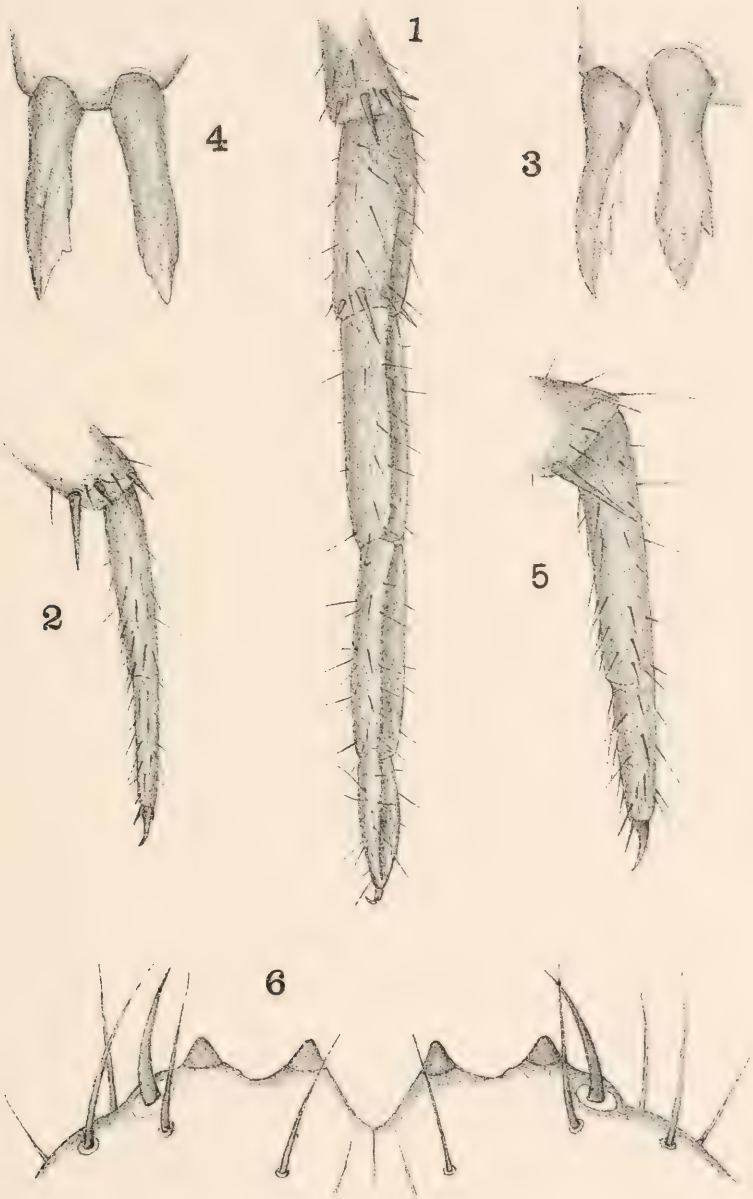
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PLATE 6.

PLATE 6.

Arebius (*Pagobius*) *kochii* (Stuxberg). (Sausalito).

Fig. 1. Ocelli of left eye. Organ of Tömösvary not shown (same scale as for Plate **1**, fig. 4).

Fig. 2. Basal spines of gonopod of female (same scale as for Plate **2**, fig. 2).

Fig. 3. Claw of left gonopod of female, ventral view (same scale as for Plate **2**, fig. 1).

Arebius (*Pagobius*) *dolius* Chamberlin. (Friant).

Fig. 4. Basal spines of left gonopod of female.

Fig. 5. Ocelli of right eye, with organ of Tömösvary in outline.

Fig. 6. Claw of right gonopod of female, ventral view (same scale as for fig. 3).

Arebius (*Pagobius*) *diplonyx* Chamberlin. (Santa Barbara).

Fig. 7. Basal spines of left gonopod of female (same scale as for fig. 2).

Fig. 8. Claw of right gonopod of female (same scale as for fig. 3).

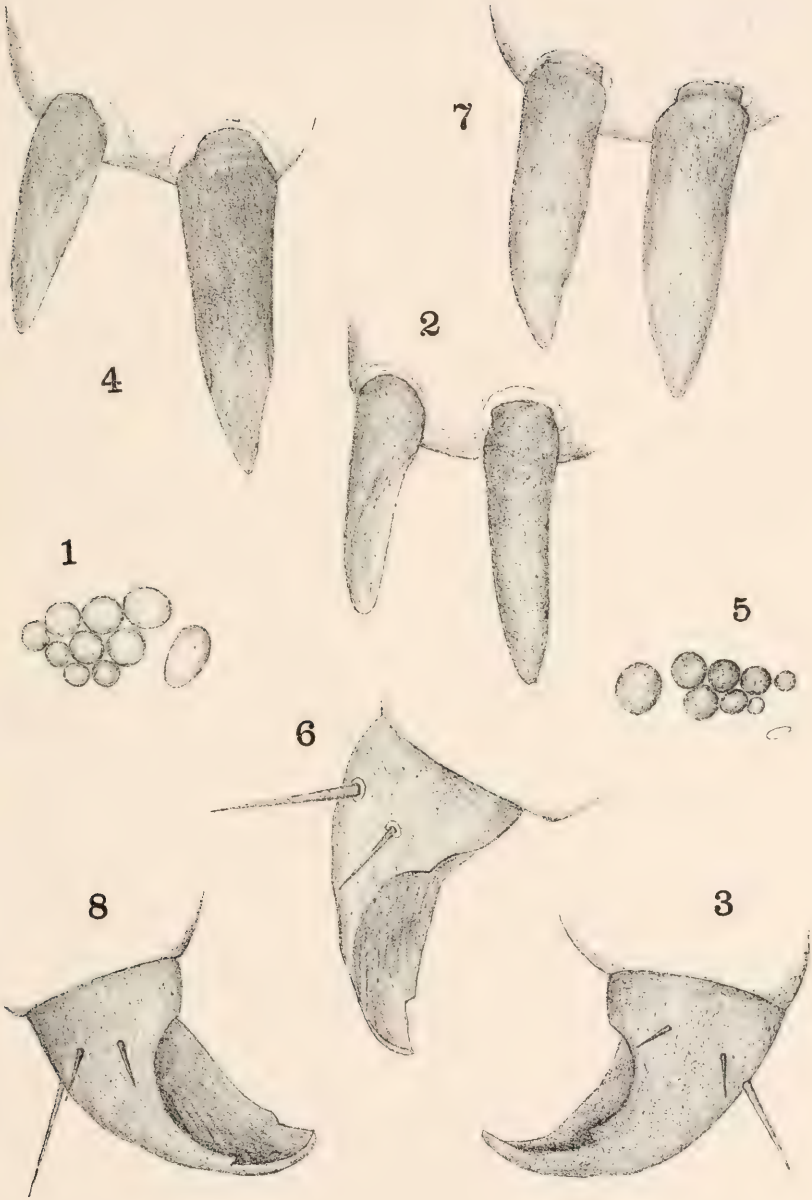
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PLATE 7.

PLATE 7.

Arebius medius Chamberlin. (Brookdale).

Fig. 1. Basal spines of right gonopod of female, ventral view (same scale as for Plate **2**, fig. 2).

Arebius elysianus Chamberlin. (Pasadena).

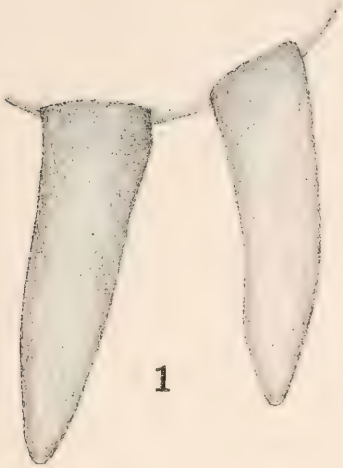
Fig. 2. Basal spines of left gonopod of female.

Arebius obesus (Stuxberg). (Stanford).

Fig. 3. Basal spines of left gonopod of female.
Fig. 4. Claw of right gonopod of female.

Arebius oregonensis Chamberlin. (Portland).

Fig. 6. Anterior portion of prosternum (bristles not represented).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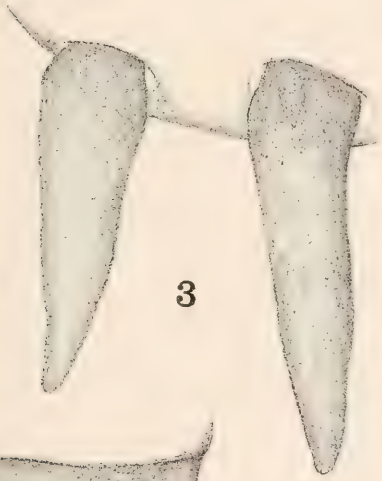
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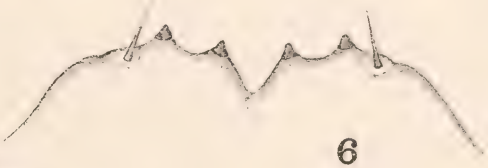
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PLATE 8.

PLATE 8.

Arebius obesus (Stuxberg). (Stanford).

Fig. 1. Portion of right gonopod of female in outline, ventral view, showing form of the first article.

Nothembius nampus Chamberlin.

Fig. 4. Basal spines of left gonopod of female.

Nothembius aberrans Chamberlin. (Eaton's Canyon).

Fig. 5. Basal spines of left gonopod of female.

Nothembius insulae Chamberlin. (Santa Cruz Island).

Fig. 6. Basal spines of left gonopod of female.

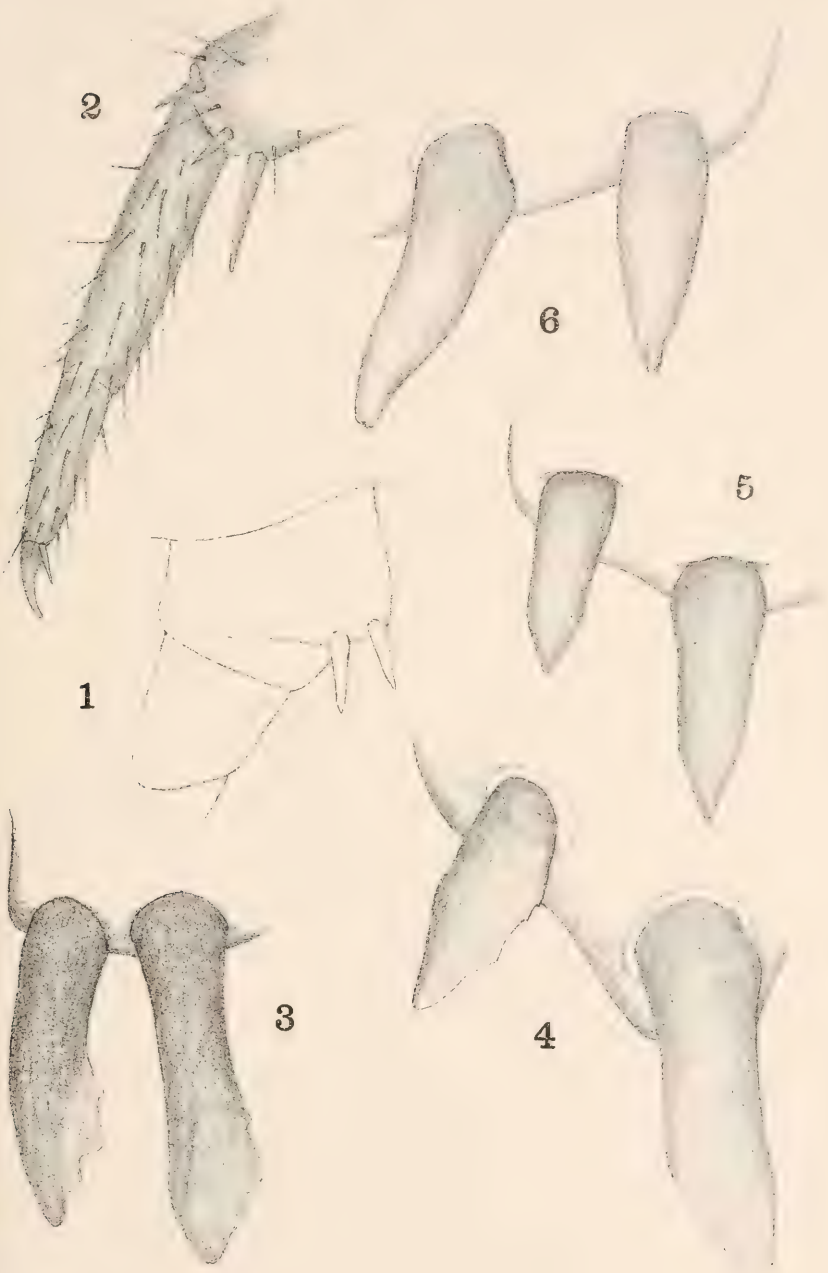
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PLATE 9.

PLATE 9.

Nothembius insulae Chamberlin. (Santa Cruz Island).

Fig. 1. Portion of right anal leg of male, ectoventral view, showing form of lobe at distal end of tibia.

Fig. 2. Outline of part of right gonopod of female, ventral view, showing form of first article.

Fig. 3. Anterior portion of prosternum.

Nothembius aberrans Chamberlin. (Eaton's Canyon).

Fig. 4. Anterior portion of prosternum.

Fig. 5. Part of left anal leg of male, mesal view, showing form of lobe at distal end of tibia.

Nothembius nampus Chamberlin. (Eaton's Canyon).

Fig. 6. Anterior portion of prosternum.

Fig. 7. Outline of portion of right gonopod of female, ventral view, showing form of first article.

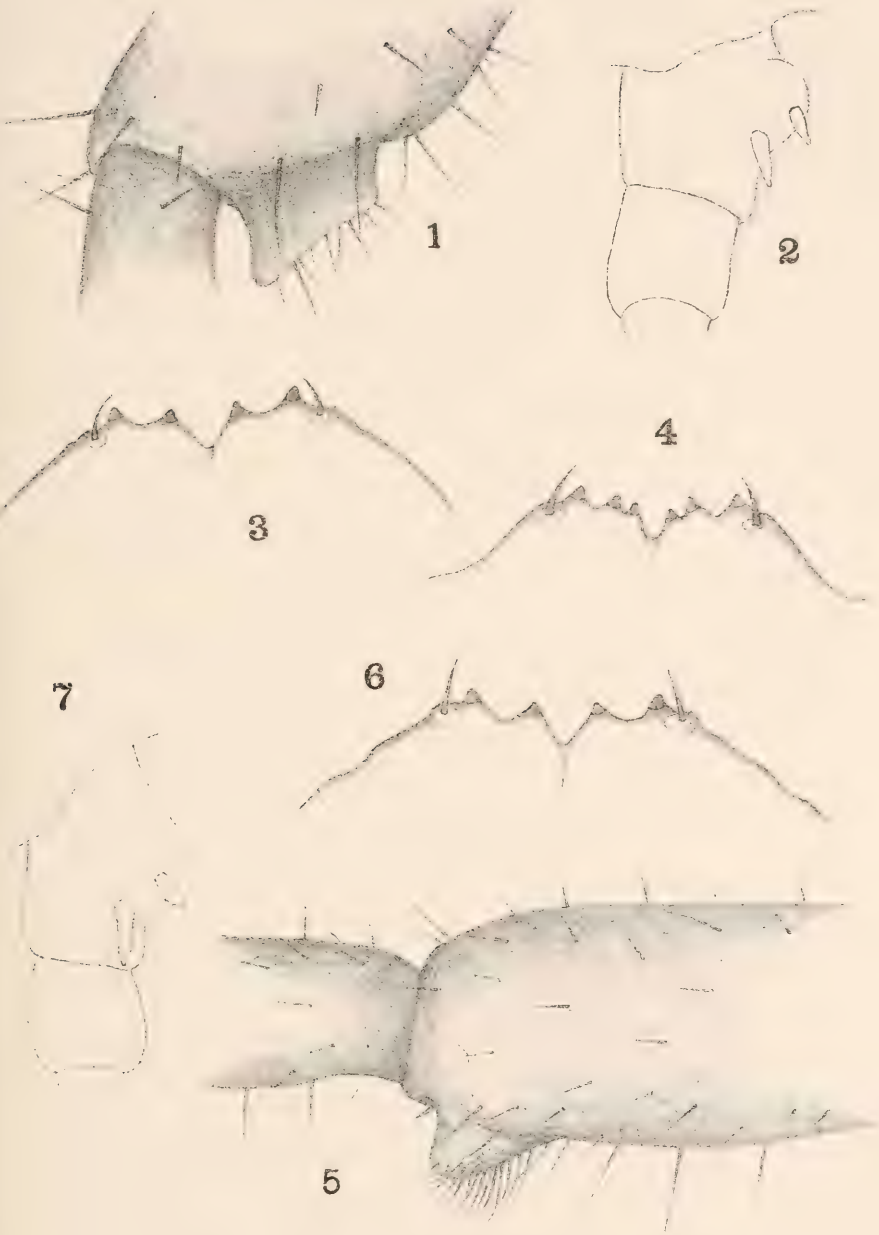
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PLATE 10.

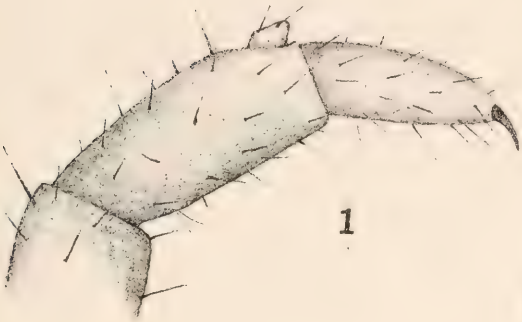
PLATE 10.

Tigobius paralus Chamberlin. (Pacific Grove, Cal.).

Fig. 1. Distal portion of right anal leg in mesal aspect showing the characteristic lobe on the first tarsal joint.
Fig. 2. Ocelli of left eye.
Fig. 3. Anterior portion of prosternum (the hairs not represented).
Fig. 4. Basal spines of left gonopod of ♀ in ventral view.

Pokabius species. (British Columbia).

Fig. 5. Ocelli of right eye.
Fig. 6. Basal spines of left gonopod of ♀, ventral view.



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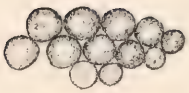

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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
Vol. LVII. No. 5.

THE GOSIBIIDAE OF AMERICA NORTH OF MEXICO.

By Ralph V. Chamberlin.

With Six Plates.

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM.
December, 1917.

No. 5.— *The Gosibiidae of America North of Mexico.*

By Ralph V. Chamberlin.

The genera included in the family Gosibiidae occur in Mexico and across the southern portion of the United States. Nearly all of the lithobioid chilopods thus far reported from Mexico, in fact, appear to belong here. When Mexico shall have been well explored, there is little doubt that the family will be found to be a large one. From the southwest it has spread in the United States northward to north central California and to Colorado and northeastward to Tennessee and North Carolina.

Lithobioidea Chamberlin.

Bull. M. C. Z., 1915, **59**, p. 531.

Erected in contrast with the new superfamily Henicopoidea to include the Lithobiidae proper, Watobiidae, Ethopolidae (Ethopolys, Bothropolys and allies), and Gosibiidae.

Gosibiidae Chamberlin.

Bull. M. C. Z., 1915, **59**, p. 531.

The members of this family have the claw of the female gonopods always large and strictly entire, with never any trace of teeth or partite condition, any element giving such trend or expression being apparently wholly absent. First article of gonopods broad, protruding well mesad, with mesal edge usually strongly chitinized and either conspicuously and characteristically excavated at base or there curving more evenly but distinctly ectad; the excavation commonly the deeper continuation of a transverse furrow or constriction extending across the proximal end of the article. Basal spines large and stout, the article beneath them compressed more or less to a thin

edge which is typically well chitinized. Spines of each gonopod nearly always in a plane, and subparallel with or making but a small angle with the principal plane of the gonopod (*i. e.* the one including the axis and the greatest diameter of the first article), and thus making a distinct angle with that of the spines of the other gonopod (*i. e.*, when seen in caudal view the two rows of spines usually meet at a distinct angle instead of lying in the same horizontal plane as in the Lithobiidae).

In the males either the penult or the anal or, much more commonly in ours, both the penult and anal legs showing conspicuous special lobes or modifications, the penult being more constantly and usually more conspicuously modified than the anal.

Excepting in the subgenus Guambius, the dorsal spines of the penult legs are 1, 0, 3, 2, 2 or 1, 0, 3, 2, 1, those of the anal legs also, with rare exceptions, being the same.

In mouthparts, eyes, general structure of prehensors, and prehensorial segment, and in most other general structural features, agreeing with the Lithobiidae proper.

Key to Genera.

a. Coxae of last five pairs of legs bearing pores.
Pseudolithobius Stuxberg.

aa. Coxae of only the last four pairs of legs bearing pores.

b. Prosternal spines very stout, exceeding the teeth in size; articles of antennae normally twenty.
Arenobius Chamberlin.

bb. Prosternal spines small and mostly bristle-like, at least distally, always more slender than the teeth; articles of antennae twenty-one to thirty-five, mostly above twenty-four.

c. Penult legs of ♂ having fifth article more or less obliquely depressed or excavated above at distal end and there bearing at very end a conspicuous lobe or crest. (Claws of anal legs two or three; species 10–15.5 mm. long).
Guambius Chamberlin.

cc. Penult legs of ♂ with fifth article thickening distad, but never excavated above nor bearing at end any such crest. (Claws of anal leg one or two; species 15–30 mm. long).
Gosibius Chamberlin.

Gosibius Chamberlin.

Can. ent., 1912, **43**, p. 204; Ann. Ent. soc. Amer., 1912, **5**, p. 146.

Lateral marginal breaks of head distinct.

Antennae from short to long, mostly moderately long; articles twenty-one to thirty-five, nearly always above twenty-four.

Eyes composed of ocelli in several series. Single ocellus distinctly largest.

Prosternal teeth 2 + 2 or, less commonly, 3 + 3. Line of apices recurved. Sinus large; between V- and U-shaped. Ectal spines much more slender than the teeth, usually, but not always, distally bristle-like.

Body moderately narrowed cephalad, distinctly less so than, *c. g.*, in Arenobius. First dorsal plate nearly always as wide as or wider than the third. Posterior angles of none, of ninth, eleventh, and thirteenth, or of the sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced.

Coxal pores circular, uniseriate; present on last four pairs of coxae.

In the male the penult legs have the fifth joint distinctly elevated distally and thus there manifestly thicker than proximally, with or without a nodular protuberance on the elevated portion but this never at the very distal end and never cristate. While rarely essentially unmodified, the anal legs usually have the fourth joint distinctly longitudinally furrowed above and widened, and in some the fifth also more or less widened and bowed ventrad, the joint along side of furrows more densely pilose. Dorsal spines of anal legs mostly 1, 0, 3, 2, 1 or 1, 0, 3, 2, 2, more rarely 1, 0, 3, 2, 0 or even 1, 0, 3, 1, 0; ventral spines 0, 1, 3, 3 (2), 1 or 0, 1, 3, 3, 2; claws one or two. Dorsal spines of penult legs 1, 0, 3, 2, 2, rarely 0, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2 or 0, 1, 3, 3, 3 or very rarely only 0, 1, 3, 3, 1. Dorsal spines of fourth to thirteenth legs, and usually of second and third as well, 0, 0, 3, 2, 2; of first legs either likewise 0, 0, 3, 2, 2 or 0, 0, 2, 2, 1 to 0, 0, 2, 1, 1. Some of the posterior coxae dorsally armed; and either none or from last one to four pairs laterally armed.

Gonopods of male uniarticulate.

Claw of female gonopods large and entire as usual. Basal spines 2 + 2 or 3 + 3. First article large, protruding mesad over base, with the inner side strongly chitinized and usually appearing conspicuously excavated proximally, commonly distinctly constricted or furrowed across base.

Species from 15 to 30 mm. in length.

TYPE.— *G. paucidens* (Wood).

The species of this genus so far as known from our region are confined to the extreme southwestern United States; *i. e.* to Arizona and California (Figure 1).

The genus is close to Guambius; but it differs, *e. g.*, conspicuously and constantly in the character of the modification in the penult legs, as also in most cases equally clearly in that of the anal legs of the male.

Key to Subgenera and Species of Gosibius.

a. Posterior angles of none of the dorsal plates produced. *Abatobius*, subgen. nov.

b. Claw of anal legs single; fifth joint of first thirteen pairs of legs with three ventral spines; dorsal spines of anal legs 1, 0, 3, 1, 0 ..... *G. arizonensis*, sp. nov.

bb. Anal legs with two claws; fifth joint of none of the legs with three ventral spines; dorsal spines of anal legs 1, 0, 3, 2, 0. *G. montereus*, sp. nov.

aa. Posterior angles of ninth, eleventh, and thirteen dorsal plates produced ..... *Gosibius*, sens. str.

b. Anal legs with two claws; basal spines of ♀ gonopods 2 + 2.

c. Ventral spines of anal legs 0, 1, 3, 3, 1. *G. monicus* Chamberlin.

cc. Ventral spines of anal legs 0, 1, 3, 3, 2; tibia of first and second legs with 2 dorsal spines. *G. claremontus*, sp. nov.

bb. Anal legs with but one claw (Basal spines of ♀ gonopods normally 3 + 3, rarely 2 + 2).

c. Ventral spines of anal legs 0, 1, 3, 3, 2; articles of antennae twenty-eight to thirty-five ..... *G. paucidens* (Wood).

cc. Ventral spines of anal legs 0, 1, 3, 2, 1 or 0, 1, 3, 3, 1; articles of antennae twenty-one to twenty-three. *G. brevicornis*, sp. nov.

aaa. Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced ..... *Timiobius*, subgen. nov. Anal legs with two claws ..... *G. intermedius*, sp. nov.

Fig. 1. Distribution of Gosibius.

Gosibius (Gosibius) paucidens (Wood).

Plate **1**, fig. 1–4.

Lithobius paucidens Wood, Journ. Acad. nat. sci. Phil., n. s., 1862, **5**, p. 14; Trans. Amer. phil. soc., n. s., 1865, **13**, p. 151.

Lithobius paucidens Stuxberg, Öfver. K. vet.-akad. Förh., 1875, p. 12; Proc. Cal. acad. sci., 1877, **7**, p. 137.

Lithobius paucidens Chamberlin, Ann. Ent. soc. Amer., 1909, **2**, p. 191; Pomona college journ. ent., 1910, **2**, p. 372.

Gosibius paucidens Chamberlin, Can. ent., 1912, **43**, p. 204.

Diagnosis.— Dark brown with a darker median dorsal stripe; head and first and last tergites orange or ferruginous. Antennae long; articles twenty-eight to thirty-five. Ocelli fourteen to twenty in four or five series. Prosternal teeth 2 + 2. First dorsal plate wider than third. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. Basal spines of female gonopods 3 + 3, or rarely 2 + 2. Dorsal spines of from last seven to last ten pairs of legs 1, 0, 3, 2, 2; of the others, 0, 0, 3, 2, 2. Anal legs with claw single; ventral spines 0, 1, 3, 3, 2; dorsal 1, 0, 3, 2, 2. Ventral spines of twelfth and thirteenth legs 0, 1, 3, 3, 3; of seventh to eleventh 0, 0, 3, 3, 3; of others 0, 0, 2, 3, 3. Trochanter of last four pairs of legs armed. Anal legs of male with fourth joint widened, complanate, and longitudinally furrowed above (Plate **1**, fig. 3). Penult legs of male with fifth joint elevated distad (Plate **1**, fig. 4). Length 18–30 mm.

Description.— Dorsum testaceous to dark brown and subferruginous, usually with a dark median longitudinal stripe which is often black and rather wide, sometimes embracing most of width of dorsum, the dark color becoming more dilute ectad. Head orange or ferruginous, with the first and the last dorsal plate usually of similar color but this paler or more dilute, though sometimes these plates scarcely differ from the rest of the dorsum; the dark median stripe of dorsum often extending upon head. Antennae like head or nearly so. Venter yellow to testaceous and almost clear brown, the last 3 or 4 plates darker, commonly of orange or ferruginous cast. Prosternum and prehensors orange to ferruginous. Legs yellow to testaceous; the caudal pairs a little darker than others, uniform.

Body mostly near 7.75 times longer than width of tenth plate. Only moderately narrowed cephalad to first plate which is wider

than the third but much narrower than the head. Width of head and of first, third, eighth, and tenth plates to each other (in ♀) as 69 : 63 : 62 : 69 : 72.

Head broadly subcordate; the sides caudal of marginal breaks moderately converging, the caudal corners well rounded and the caudal margin mesally incurved. Considerably wider than long (7:6 or nearly so). Appearing smooth and shining, being only obscurely roughened and with the punctae fine. A rather deep sulcus, this usually angular and often pit-like at middle; sometimes a median longitudinal sulcus leading forward from it.

Antennae long, reaching mostly somewhere between beginning of eighth and end of ninth segment, varying considerably. Articles twenty-eight to thirty, all long and cylindric, usually more or less uniformly and gradually decreasing distad, occasionally those beyond the first 12–16 rather abruptly shorter. Hairs short.

Ocelli from fourteen to twenty in number, nearly always in four series but occasionally in five. The most frequent arrangement is 1 + 4, 4, 4, 3. Examples of other arrangements are: 1 + 4, 4, 3, 2; 1 + 4, 4, 3, 3; 1 + 4, 5, 5, 4; 1 + 4, 4, 4, 3, 1; 1 + 4, 4, 4, 3, 2. The single ocellus not contiguous with the others, much largest. Of the seriate ocelli those of most dorsal row are largest, often much differing among themselves, those of second row but little smaller or not at all so, those of lowest row considerably smallest as usual.

Prosternum 1.6 times wider than long. Anterior margin widely rounded. Teeth 2 + 2; small, well separated, but dental line as a whole relatively short; mesal tooth larger than the ectal, but its apex farther caudad and thus line of apices is recurved. Spine well ectad of outer tooth, long and slender but stouter than the bristles and also paler than the latter; springing from a rounded nodule. Distance between chitinous spots 4.66 times dental line; 1.75 times width at level of bottom of sinus.

Surface of first dorsal plate nearly like that of head, appearing smooth and shining, or only obscurely uneven. Other tergites more distinctly roughened, especially the more caudal ones; these usually showing the short, submarginal, transverse sulcus on each side at about beginning of caudal third of length and a second similar, but less deeply impressed, one at middle of length; usually more or less evident also is a longitudinal furrow extending somewhat mesad of caudad from anterior margin between median line and lateral margin and bending mesad near beginning of middle third of length to join, or nearly join, the corresponding one of the other side, sometimes a branch continuing farther caudad also evident.

Ventral plates appearing mostly smooth and shining; with the usual three longitudinal furrows, the lateral ones, however, absent or obscure on the last one or two.

Coxal pores circular or transversely a little elongate and broadly elliptic. A common number and arrangement is 5, 4, 4, 4. The twelfth coxa has practically always one more pore than the others which have typically uniformly the same number. Other numbers are: 4, 3, 3, 3; 6, 5, 5, 5; and 7, 6, 6, 6.

Spines of first to fifth legs, $\frac{0,0,3,2,2}{0,0,2,3,3}$; of sixth, the same or, $\frac{0,0,3,2,2}{0,0,3,3,3}$; of seventh and eighth, $\frac{0,0,3,2,2}{0,0,3,3,3}$ or, $\frac{1,0,3,2,2}{0,0,3,3,3}$; of ninth to eleventh, $\frac{1,0,3,2,2}{0,0,3,3,3}$; of twelfth to penult, $\frac{1,0,3,2,2}{0,1,3,3,3}$, all with 3 claws; of the anal, $\frac{1,0,3,2,2}{0,1,3,3,2}$, claw 1. Last 7 to 9 pairs of coxae laterally armed.

In the female the posterior legs are short and slender; the prefemur and femur of anal legs longitudinally furrowed above, the latter the more distinctly so; the corresponding articles in penult legs more indistinctly furrowed. In the male the posterior legs are also slender; but the femur in the anal pair is typically considerably crassate and wider than the other articles, dorsally complanate and longitudinally deeply furrowed, with numerous hairs along and each side of furrow (Plate **1**, fig. 3). The penult legs in the male have the prefemur and especially the femur longitudinally dorsally furrowed, while the tibia is clavately swollen, being wider and especially conspicuously thicker dorsoventrally at the distal end (Plate **1**, fig. 4). There is considerable variation in the conspicuousness of these modifications, which in some specimens are weak.

Gonopods of male distinctly exposed. The single article in ventral view appears truncate distally, in lateral view seem to be narrowed to an edge.

Claw of female gonopods as usual; long and acute, strongly curved. Basal spines 3 + 3, rarely only 2 + 2; margin along which attached thin, strongly chitinous, blackish. Inner edge strongly chitinized. First article conspicuously excavated within proximally; transversely furrowed or constricted across base [1] (Plate **1**, fig. 2).

Length 18–30 mm. A female 20 mm. long has antennae 10 mm. long, anal leg 7.5 mm. long; and tenth dorsal plate 2.6 mm. wide.

Immaturus (♂).— Dorsum dilute testaceous to light brown. Head brown or paler, yellowish, the pigment denser than in dorsum of body.

[1] Several females from Claremont have a stout spine at distal end of second article of gonopod, on left side in all. I have never noted myself or seen record of such occurrence of a spine on this article in any other species of the Lithobioidea.

Antennae brown to yellow. Prosternum and prehensors like head. Venter pale yellow to dilute brown, in most strongly suffused with green. Legs pale yellow to dilute brown, nearly uniform.

Antennae varying considerably in length but mostly approaching the proportion of those of adult. Articles twenty-seven to thirty.

Ocelli 1 + 4, 4, 3; 1 + 4, 3, 2; 1 + 3, 4, 3, 1; 1 + 4, 4, 3, 1; 1 + 4, 3, 3, 2; 1 + 4, 4, 3, 2; proportioned nearly as in *maturus*.

Prosternum essentially as in *maturus*.

Coxal pores mostly 3, 2, 2, 2.

Spines of first legs, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2\,(3)}$; of second to fifth as in adult; of sixth and seventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$; of eighth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$ or $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,3}$; of ninth, $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$ or $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,3}$; of tenth to anal as in *maturus*. Last four pairs of coxae laterally armed.

Anal legs in male slender, the fourth article but little enlarged, and other modifications usually more weakly indicated but their expression somewhat variable.

Length 14.5–17 mm.

Agenitalis II. Greenish. Head dilute olivaceous with a tendency toward dull dilute orange in the frontal region; a dark spot caudad of the suture. Antennae brown, paler distad. Legs all pale, uniform.

Antennae short, reaching fifth or sixth segment. Articles twenty-six to twenty-eight, short ones intermingled with longer ones.

Ocelli 1 + 4, 4, 3; 1 + 4, 3, 2; 1 + 4, 4, 3, 1; 1 + 4, 3, 2, 1.

Prosternal teeth 2 + 2. Sinus and spines as in adult or nearly so. Sides of anterior portion a little less strongly convexly rounded.

Coxal pores 2, 1, 1, 1.

Spines of first legs, $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,2,\,3,\,1}$; of the second, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,3,\,1}$; of the third and fourth, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,3,\,3}$; of the fifth to ninth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$; of the tenth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$ or, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,3}$; of the eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$; of the twelfth, $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,3}$; of the thirteenth and penult, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,2,\,1}$; of the anal, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,1,\,1}$. Twelfth coxae armed laterally.

Anal glands degenerate.

Length of specimens described 11.5–14.5 mm. (Santa Barbara; March, 1910).

Female gonopods straight, pale. Either two or all three articles present; glabrous and with no indications of spines.

Agenitalis I.— Greenish, with caudal borders of most plates more brownish. Head and antennae yellowish brown, the greenish tinge being obscure. Legs pale, uniform.

Antennae wanting.

Ocelli 1 + 4, 3, 2. All pale, the anterior and ventral ones especially so. Single ocellus largest.

Prosternal teeth 2 + 2. Sinus apparently same as in adult or relatively a little narrower. Sides of anterior portion less convex and less extended laterad than in *maturus*.

Coxal pores 2, 1, 1, 1.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,3,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,1}$; of the third, $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the fourth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fifth to eighth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the ninth, $\frac{0,0,3,2,2}{0,0,2,3,3}$; of the tenth, $\frac{0,0,3,2,2}{0,0,3,3,3}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or on one side $\frac{0,0,3,2,2}{0,0,2,3,3}$; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,--}$; of the thirteenth and penult, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the anal, $\frac{0,0,0,0,0}{0,0,1,1,0}$. Twelfth coxae laterally armed.

Anal glands present.

Length of specimen described, 9.2 mm. (Santa Barbara, March, 1910).

Pullus IV (*Larva quarta*). A strong greenish tinge marking the other pigment, but in one specimen the more usual purplish tinge prevailed. Head lighter, in front of suture dilute dull orange, a dark spot just back of the suture. Antennae brown, lighter distad. Legs pale, uniform.

Antennae already with twenty-six to twenty-eight articles; shorter and longer ones occurring variously. Length variable.

Ocelli 1 + 1, 3, 3, 2; 1 + 1, 4, 4, 2; 1 + 4, 4, 2; 1 + 4, 3, 2. The single ocellus of top row in first two cases at anterior end of patch. Single ocellus largest.

Prosternal teeth 2 + 2. Sinus V-shaped but narrowly rounded at bottom. Sides of anterior portion less convex than in adult and less extended laterad of teeth.

Twelfth coxae each with single pore.

Last three pairs of legs present as pale slender buds in which the division into articles is indicated in surface view by pale transverse lines.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,1,1}$ or, $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,2,2,1}{0,0,1,2,2}$ or, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth, $\frac{0,0,2,2,2}{0,0,1,2,1\,(2)}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the sixth the same as fifth or, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the seventh, $\frac{0,0,2,2,2}{0,0,1,2,2}$ or, $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the eighth the same as latter or, $\frac{0,0,3,2,2}{0,0,1,3,3}$; of the ninth, $\frac{0,0,3,2,2}{0,0,1,2,2}$ or, $\frac{0,0,3,2,2}{0,0,2,3,3}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,3,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,3}$; of the eleventh and twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$ to $\frac{0,0,2,2,2}{0,0,1,1,1}$.

Anal glands large and conspicuous.

Length 8.25–9.25 mm. (Santa Barbara, March, 1910).

TYPE LOCALITY.— California: Fort Tejon.

Also taken in California at San Bernardino, (M. C. Z., No. 557, 560); Los Angeles, (M. C. Z., No. 559, 569); Laurel Canyon, (M. C. Z., No. 567); Santa Monica, (M. C. Z., No. 573); Claremont, (M. C. Z., No. 554, 556, 558, 561, 563, 570, 576, 577); Santa Barbara, (M. C. Z., No. 562–566, 575).

A very common species in southern California.

GOSIBIUS (GOSIBIUS) BREVICORNIS, sp. nov.

Plate 2, fig. 1–4.

DIAGNOSIS.— Light to dark brown. Antennae short, with articles twenty-one to twenty-three. Ocelli nine to fourteen in three or four series. Prosternal teeth 3 + 3. First dorsal plate of same width as the third. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. Basal spines of female gonopods 3 + 3. Anal leg with claw single; dorsal spines 1, 0, 3, 2, 1, ventral 0, 1, 3, 2, 1 or 0, 1, 3, 3, 1. Dorsal spines of ninth to penult legs 1, 0, 3, 2, 2; ventral spines of penult 0, 1, 3, 3, 1 (♂) or 0, 1, 3, 3, 2 (♀). Ventral spines of tenth to thirteenth legs 1, 0, 3, 3, 3; of second to eighth 0, 0, 3, 3, 3. Dorsal spines of third to eighth legs 0, 0, 3, 2, 2. None of coxae laterally armed. Last six pairs of trochanters armed. Anal legs of male with fourth and fifth articles strongly widened, the fifth bowed ventrad and both articles dorsally furrowed. (Plate 2, fig. 2). Fifth joint of penult legs of male elevated distad, bearing a rounded eminence at beginning of elevated region (Plate 2, fig. 4). Length 16 to 30 mm.

DESCRIPTION.— Dorsum light or testaceous brown to deep brown, the head either the same or, in lighter specimens with a tendency toward very dilute orange while in darkest specimens it and the first plate are darker, chestnut. Antennae like the head, *i. e.*, chestnut in specimens in full color either uniform or, in some, paler distad. Prosternum and prehensors like head. Venter from light yellowish brown to dark brown, the last plates darker as usual. Legs dilute yellow to pale brown, the posterior pairs in females and lighter males not darker than the others, but in darker ones of weak chestnut color.

In males body nearly parallel-sided from the tenth segment cephalad, strongly narrowed caudad of twelfth plate, first and third tergites of same width. In females first plate is narrower than the third, and

body narrower caudad from eighth plate which is of same width as seventh. In females widths of head and of first, third, seventh, eighth, tenth, and twelfth plates to each other as 46: 45: 47: 50: 50: 47: 43. In males, omitting the seventh plate, the relations are 66: 67: 67: 73: 73: 70. Body rather slender, typically 9–9.3 times longer than width of eighth plate.

Head suborbicular, the caudal margin being typically convex, often considerably so, though sometimes varying to nearly straight. Marginal breaks weak, oblique. Head smooth excepting for several pairs of impressed dots between suture and caudal margin and two impressions in median line in front of suture. A little wider than long (66: 65 to 46: 45).

Antennae short, reaching only to the fourth or fifth segment. Strongly narrowed distad. Articles twenty-one to twenty-three; mostly proportionately long, but the seventh and eighth, and the fourteenth and fifteenth (or sometimes thirteenth and fourteenth) articles typically abruptly much shorter than adjacent ones.

Ocelli nine to fourteen in three or four series: *e. g.*, 1 + 4, 4, 3; 1 + 3, 3, 2; 1 + 5, 3, 3; 1 + 3, 4, 4, 2; 1 + 4, 4, 3, 2. Eye-patch very small in proportion to size of head, more toward ventral side of head than usual. Ocelli pale and inconspicuous. Single ocellus much largest, well separated. Other ocelli decreasing conspicuously cephalad and ventrad.

Prosternal teeth 3 + 3; moderately large, the median on each side largest, so that if most mesal one on each side were omitted the line of apices would be procurved. Sinus between V- and U-shaped. Spines much stouter than bristles, truly spiniform, inserted close to edge of ectal tooth. Sides of anterior portion straight, slanting directly back from spine. Prosternum 1.4 to 1.5 times wider than long. Distance between chitinous spots 3.25–3.27 times dental line; 2.5–2.66 times the width at level of bottom of sinus (Plate **2**, fig. 1).

First dorsal plate 1.63–1.66 times wider than long. Especially the more caudal dorsal plates conspicuously depressed transversely in front of the caudal border and within and parallel with each lateral border, especially of caudal portion, of plate and the edges outside the depression more or less bent upwards. Plates not roughened. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced, the processes rather wide and distally narrowly rounded, not acute.

Coxal pores small, circular: 4, 4, 4, 4; 4, 3, 3, 3; 4, 3, 4, 4; 4, 3, 3, 4; etc.

Spines of first legs, $\frac{0,0,2,2,2}{0,0,2,3,3}$ (♂) or, $\frac{0,0,2,2,1}{0,0,2,3,3}$ (observed only in ♀); of the second to eighth, $\frac{0,0,3,2,2}{0,0,3,3,3}$; of the ninth, $\frac{1,0,3,2,2}{0,0,3,3,3}$; of the tenth to thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,3}$; of the penult, $\frac{1,0,3,2,2}{0,1,3,3,1}$ (♂) or, $\frac{1,0,3,2,2}{0,1,3,3,2}$ (mostly ♀); of the anal, $\frac{1,0,3,2,1}{0,1,3,2,1}$ or, $\frac{1,0,3,2,1}{0,1,3,3,1}$, the claw single. None of the coxae laterally armed.

Posterior legs of females short and very slender, not at all thickened. In the anal legs of the male the fourth and fifth joints are conspicuously expanded laterally but are not thickened dorsoventrally and thus appear flattened; the fifth joint as a whole markedly bowed ventrad and longitudinally furrowed along the dorsal surface, the fourth joint also furrowed but not so deeply so; fourth and, especially, the fifth joints with numerous straight hairs, the other joints being more sparsely clothed; sixth joint abruptly much more slender than the fifth (Plate 2, fig. 2, 3). Penult legs of male with fourth and fifth joints somewhat enlarged, the fifth joint decidedly more elevated distad and bearing upon dorsal surface toward mesal side of anterior end of elevated portion a low rounded eminence (Plate 2, fig. 4).

Gonopods of male distinctly exposed; flattened; distally subtruncate; bearing many hairs.

Claw of female gonopods long, moderately curved, excavated and thin, acute. Spines 3 + 3, conical from base, acute; ectal one much longer than most mesal. Inner side of first article well chitinized, bent ectad at base but not truly excavated.

Males clearly exceeding the females in average size, ranging from 21 to 30 mm. (mostly 25–30 mm.) in length as against 16–21 mm. (mostly 18–20 mm.) for the females. In a male 30 mm. long the eighth and tenth plates are 3.2 mm. wide; and in a female 20 mm. long the width of eighth plate is 2.2 mm.

Praematurus.— Light brown, head somewhat darker and of dilute chestnut tinge. Antennae like head as are also prosternum and prehensors or those a little lighter. Venter pale, often but not always of a strong greenish tinge. Legs pale, uniform.

Antennae as in adult.

Ocelli 1 + 3, 3, 1; 1 + 3, 3, 2. Organ of Tömösvary in outline smaller than largest seriate ocelli and larger than the smallest ones.

Prosternum as in *maturus*, on the teeth adjacent to sinus in some relatively smaller. Spines a little more slender.

Coxal pores 4, 3, 3, 3; 3, 3, 3, 3.

Spines 3 + 3 or sometimes 3 + 2 and more rarely only 2 + 2,

but the most mesal spine on each side much smaller, the median one of each side intermediate; all more slender and acute than in *maturus*.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 3}$; of second to fifth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 3}$; of sixth and seventh the same or, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 3}$; of the other legs same as in adult.

Claw of female gonopods shorter than in adult and only slightly curved distad or in some essentially straight; acute, pale.

Length 15–17 mm.

Immaturus.— Dorsum pale greenish brown. Head commonly a little darker and a clearer brown. Antennae light brown to dilute chestnut. Venter more distinctly greenish than the dorsum. All legs pale.

Body apparently more decidedly narrowed caudad from the middle than in *maturus*.

Antennae composed of nineteen to twenty articles; articles five, six, and seven, and twelve and thirteen shorter than adjacent ones. Ultimate article proportionately long, equalling or exceeding in length the three preceding ones taken together.

Ocelli $1 + 3, 2, 1$; $1 + 2, 2$; $1 + 2, 1$. Single ocellus clearly largest.

Prosternal teeth $3 + 3$ but the most mesal on each side minute or indicated by a mere point. Spines distally more slender and bristle-like than in the adult.

Coxal pores, 3, 2, 2, 2; 2, 2, 2, 2.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the second, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 3}$ or dorsal spines 0, 0, 3, 2, 2; of the third to seventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 3}$; of the others as in *maturus* excepting for lack of dorsal spine on coxae of ninth to thirteenth and sometimes fourteenth legs. The dorsal spines of coxae of anal and penult legs very small and slender.

Claw of female gonopods short, pale, acute, not at all curved. Spines $1 + 1$; appearing as minute, acute points.

Length 11–14 mm.

Pullus IV.— Pale brown. Head and antennae a little darker, of chestnut tinge. Venter lighter than dorsum. Legs all pale.

Antennae composed of sixteen articles, of which the fifth and sixth and the tenth and eleventh are distinctly shorter than the adjacent ones.

Ocelli $1 + 2, 1$. All pale. Single one largest.

Prosternal teeth $2 + 2$. Sinus subsemicircular. Spine short, acute, more slender than in older stages.

A single pore on each twelfth coxa.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the second, $\frac{0,0,1,2,1}{0,0,1,1,2}$ or, $\frac{0,0,1,2,1}{0,0,1,2,2}$; of the third to fifth, $\frac{0,0,1,2,2}{0,0,1,2,2}$; of the seventh, $\frac{0,0,1,2,2}{0,0,1,2,3}$; of the eighth, $\frac{0,0,3,2,2}{0,0,1,2,3}$ or ventral spines may be 0, 0, 2, 3, 3; of the ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or ventral spines 0, 0, 2, 3, 3; of the tenth, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the eleventh and twelfth, $\frac{0,0,1,0,0}{0,0,1,1,0}$.

Anal glands very large and distinct.

Length *circa* 7.75 mm.

TYPE.— M. C. Z., No. 552, California: Friant.

PARATYPES.— M. C. Z., No. 545–548, 550–551, 553, California: Friant; M. C. Z., No. 549, Fresno. R. V. and S. C. Chamberlin.

Numerous specimens were taken at Friant under stones in the open near the mouth of the canyon. The conspicuous difference in size between the sexes suggests that occurring in *Pseudolithobius megaloporus*.

GOSIBIUS (GOSIBIUS) MONICUS Chamberlin.

Ann. Ent. soc. Amer., 1912, **5**, p. 146.

DIAGNOSIS.— Brown with a darker middorsal stripe; head light ferruginous. Articles of antennae above twenty-nine in number. Ocelli fifteen to seventeen in four series. Prosternal teeth 2 + 2. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced. Basal spines of female gonopods 2 + 2. Dorsal spines of anal legs 1, 0, 3, 2, 2 (or 1?); ventral, 0, 1, 3, 3, 1; claws two. Dorsal spines of tenth or eleventh to penult legs 1, 0, 3, 2, 2; of third to ninth or tenth, 0, 0, 3, 2, 2. Ventral spines of fifth to ninth legs 0, 0, 2, 3, 3; of tenth and eleventh 0, 0, 3, 3, 3; of twelfth and thirteenth 0, 1, 3, 3, 3; of penult 0, 1, 3, 3, 2; of first to fourth 0, 0, 2, 3, 2. Length 14–15 mm.

DESCRIPTION.— Dorsum brown with a darker median longitudinal stripe which shows a marked tendency to spread laterad at the caudal end of each plate and may reach the lateral margins along the caudal border. Head subferruginous, the median longitudinal stripe of dorsum of body continuing upon it as far as a little caudad of frontal suture where it ends abruptly at a pale transverse band along the suture. Antennae similar to head. Prosternum and prehensors pale ferruginous. Venter yellow or testaceous, the caudal segments darker, somewhat ferruginous. Legs yellow or testaceous like venter, nearly uniform or the caudal pairs slightly darker dorsally.

Body rather robust, in type being only seven times longer than width of tenth plate. Moderately narrowed cephalad; strongly and uniformly narrowed caudad. Eighth and tenth plates of same width or the eighth a little wider, these clearly wider than the head. First plate slightly narrower than the third in female. Widths of head and of first, third, eighth, and tenth plates to each other as 53:47:48:57:57.

Head subcordate. Wider than long in ratio 47:45. Caudal margin mesally gently incurved, the sides conspicuously converging from marginal breaks caudad and rounding about corners. A median longitudinal sulcus extends cephalad from the suture to a transverse depression between the antennae. A short, deep transverse sulcus a little in front of caudal marginal elevation, the same more weakly indicated farther laterad on each side. Head smooth and shining, not punctate or rugose.

In types the antennae have their ends broken off so that precise number of articles cannot be determined; but at least twenty-nine are present. The articles present are of nearly same form and proportions as in *G. paucidens*.

Ocelli fifteen to seventeen in four series: *e. g.*, 1 + 4, 4, 4, 2; 1 + 5, 4, 4, 2; 1 + 4, 4, 4, 4; 1 + 4, 4, 3, 4. Much as in *G. paucidens*.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.1 times width at sinus; 3.9 times dental line. Teeth 2 + 2, stout, conical, relatively larger than in *paucidens*. Spine long, distally drawn out in bristle-like form, its tubercle contiguous with base of outer tooth, attached on ventral side of edge.

First dorsal plate smooth and shining like the head or only obscurely roughened. Other plates more or less roughened, the more caudal ones most strongly so. Major plates with the usual short transverse submarginal sulci near caudal third, the seventh having an additional similar one on each side at about middle of length. A longitudinal sulcus on each side midway between median line and lateral margin, the sulcus at about beginning of the middle third sending a more clearly impressed branch directly mesad where it often unites with corresponding one of other side; often also a shorter sulcus running from near anterior margin obliquely caudoectad toward point of origin of this transverse branch.

Ventral plates appearing smooth and shining. The usual three longitudinal impressions indicated with varying degrees of distinctness. On several of the caudal sternites the median mark may end caudad in a deeper pit-like and somewhat transverse depression a little in front of the caudal margin.

Coxal pores circular and small: 4, 3, 3, 3 in types.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the second, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the third and fourth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the fifth to ninth, $\frac{0,0,3,2,2}{0,0,2,3,3}$; of the tenth and eleventh, $\frac{1,0,3,2,2}{0,0,3,3,3}$; or coxal spine may be absent from tenth; of the twelfth and thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,3}$; of the penult, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,2,2}{0,1,3,3,1}$, claws 2. Last four pairs of coxae laterally armed. Dorsal spine of eleventh coxae small.

Anal legs of female short and moderately slender; the dorsal surface of femur and tibia distinctly longitudinally furrowed, the same articles of penult legs, especially the femur, similarly but less strongly furrowed.

Male unknown.

Gonopods of female long. Claw large, of usual form. First article strongly constricted at base leaving a conspicuous lobe distad projecting mesad and touching corresponding lobe of the other gonopod, the anterior edge of these lobes at right angles to longitudinal axis of body or nearly so; mesal side strongly chitinized as in *G. paucidens*. Spines 2 + 2; stout; inner smaller than the outer one on each side. Process of sternite first clavately widening, presenting a point on each side, and then narrowing distad and becoming very slender and acute.

Length of types (♀ ♀) 14–15 mm. The specimen 14 mm. long has anal leg 5.8 mm. long and tenth plate 2 mm. wide.

Type.— M. C. Z. No. 578, California: Santa Monica, June, 1909.

This species is manifestly close in many features to *G. paucidens*. It differs clearly, however, in much smaller size, in having the anal legs armed with two distinct claws, in ventral spines of anal legs, in dorsal spines of anterior pairs, in having the basal spines of female gonopods 2 + 2, etc.

Gosibius (Timiobius) intermedius, sp. nov.

Plate 3, fig. 2, 3.

Diagnosis.— Brown; head dilute chestnut. Marginal breaks of head small and inconspicuous. Antennae moderate; articles twenty-eight. Ocelli seventeen in four series. Prosternal teeth 3 + 3 Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced. Claws of anal legs two; dorsal spines 1, 0, 3, 2, 0; ventral 0, 1, 3, 3, 1. Dorsal spines of ninth or tenth

to penult legs 1, 0, 3, 2, 2; of first or second to eighth or ninth 0, 0, 3, 2, 2. Ventral spines of thirteenth and penult legs 0, 1, 3, 3, 3; of fourth to twelfth, 0, 0, 3, 3, 3; of first to third, 0, 0, 2, 3, 3. Last four pairs of coxae laterally armed. Anal legs in male slender, unmodified. Penult legs with a low rounded eminence on dorsal surface at distal end of tibia. Length 19 mm.

Description.— Brown, the first plate darker. Head darker than dorsum, in type dilute chestnut. Antennae light or yellowish brown. Legs pale, the caudal pairs more densely pigmented, yellowish. Prosternum and prehensors dilute chestnut. Venter pale testaceous, the caudal plates darker, burnt brown.

Body very conspicuously narrowed both cephalad and caudad from the eighth segment. First and third tergites equal in width. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 50: 46: 46: 66: 60: 51.

Head broadly subcordate; wider than long in ratio 25: 23. Lateral margined breaks very small and inconspicuous. A sharply impressed transverse sulcus in front of caudal border, slightly convex; anterolaterad from each end of this a short, oblique impressed line. The usual broad and shallow longitudinal depressions in front of the transverse sulcus, these nearly parallel and extending to the anterior end of head.

Antennae of moderate length. Articles in type twenty-eight; of these the first four or five are rather long, the others being moderate with a longer one occurring at intervals. Ultimate article shorter than the two preceding taken together.

Ocelli seventeen in four series: 1 + 4, 4, 4, 4. Single ocellus much largest. Of the seriate ocelli the most ventral are much the smallest; the dorsal ones conspicuously largest, somewhat irregular in form.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.44 times width at level of bottom of sinus; 4 times the dental line. Teeth 3 + 3; small; the most mesal on each side smallest and lowest; line of apices of teeth, omitting innermost on each side, nearly straight. Sinus small, rounded at bottom. Spines small and hair-like. Sides of anterior portion of prosternum nearly evenly convexly rounded from spine to prehensor.

First dorsal plate moderately narrowing caudad; 1.6– times wider than long. Major dorsal plates with the usual broad longitudinal depressions or furrows which diverge a little caudad; commonly each gives off anteriorly a branch which runs nearly straight cephalad to anterior margin. Plates roughened. Clothed with short, acute hairs

which are more numerous toward lateral margins and which arise mostly from small tuberculiform elevations. The seventh to tenth plates especially with the lateral margins distinctly denticulate or serrulate, the teeth on seventh to ninth longest and most acute; on the plates each way from these the irregularities become more crenulate and weak and there disappearing. Marginal hairs spring from the incisions caudad of the teeth (Plate **3**, fig. 2). The fourteenth plate is narrowest a little cephalad of caudal end, the sides from there then again weakly diverging caudad; caudal margin mesally incurved (Plate **3**, fig. 3). Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced, but those of the sixth rather weakly so; processes broad, becoming more acute on the caudal plates.

Coxal pores circular, of moderate size: 4, 4, 4, 4.

Spines of first legs, $\frac{0,0,2,3,2}{0,0,2,3,3}$ or $\frac{0,0,3,2,2}{0,0,2,3,3}$; of second and third, $\frac{0,0,3,2,2}{0,0,2,3,3}$; of fourth to eighth or ninth, $\frac{0,0,3,2,2}{0,0,3,3,3}$; of ninth or tenth to twelfth, $\frac{1,0,3,2,2}{0,0,3,3,3}$; of thirteenth and penult, $\frac{1,0,3,2,2}{0,1,3,3,3}$, claws 3; of anal, $\frac{1,0,3,2,0}{0,1,3,3,1}$, claws 2. Last four pairs of coxae laterally armed.

Anal legs in male slender, without special modifications. Penult legs also slender but with the tibia bearing a low rounded lobe or elevation on dorsal surface at distal end.

Length of type (♂) near 19 mm.; width of eighth plate 3 mm.

TYPE.— M. C. Z., No. 579, California: Santa Barbara, March, 1913.

PARATYPES.— M. C. Z., No. 580, California: Santa Barbara, March, 1913. One mature and two not fully mature males.

The serrulation of part of the dorsal plates and the unusual form of the fourteenth plate in this form are features of especial interest.

GOSIBIUS (ABATOBIUS) ARIZONENSIS, sp. nov.

Plate **2**, fig. 5; Plate **3**, fig. 1.

DIAGNOSIS.— Testaceous to brown, head not differing. Antennae with articles twenty-five to twenty-eight. Ocelli seventeen to nineteen in four series. Prosternal teeth 2 + 2. Posterior angles of none of dorsal plates produced. Basal spines of female gonopods 2 + 2. Anal leg with claw single; dorsal spines 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 1. Dorsal spines of twelfth to penult legs 1, 0, 3, 2, 2; of

all others 0, 0, 3, 2, 2. Ventral spines of penult legs 0, 1, 3, 3, 2; of thirteenth 0, 1, 3, 3, 3; of eighth to twelfth, 0, 0, 3, 3, 3. Last four pairs of coxae laterally armed. Anal legs in male type missing. Penult with tibia enlarged distad as usual. Length 18–22 mm.

Description.— Dorsum testaceous to brown, the head the same, but fifteenth plate abruptly paler; the caudal borders of plates and head may be darker as they may also be in a longitudinal median stripe. Antennae yellow to yellowish brown. Prosternum and prehensors like head or a little paler. Venter yellow or brownish yellow, the caudal plates more densely pigmented. Legs similar in color to corresponding plates of venter, the posterior pairs somewhat orange.

Body moderately narrowed cephalad from the tenth segment. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other (in ♂ type) as 52: 52: 51: 58: 57: 55.

Head wider than long in ratio 52: 47. Smooth. Hairs sparse.

Antennae moderately long, reaching upon the seventh segment. Articles twenty-five to twenty-eight; mostly long, those composing a varying proportion of distal portion short.

Ocelli seventeen to nineteen in four series: *e. g.*, 1 + 5, 4, 4, 3; 1 + 4, 5, 5, 3; 1 + 5, 4, 5, 4; 1 + 5, 5, 4, 3. Single ocellus largest. Seriate ocelli conspicuously decreasing in size cephalad and ventrad, varying considerably.

Prosternal teeth 2 + 2, small, well separated. Inner one on each side larger than the outer; line of apices a little procurved. Sinus between V-shaped and semicircular, the sides being concave and the bottom more or less rounded (Plate 3, fig. 1). Prosternum 1.6 times wider than long. Distance between chitinous spots 3 times width at level of bottom of median sinus; 4.4 times the dental line. Spines straight, slender, and acute, inserted a little ectad of tooth. Margin extending laterad almost horizontally a little distance from spine and then bending back caudoectad to prehensor.

First dorsal plate equalling head in width; 1.7 times wider than long. Posterior angles of none of the dorsal plates produced; posterior corners of ninth shortly obliquely excised, those of eleventh and thirteenth straight or excised on one side. Major plates mostly showing a median longitudinal furrow, and one diverging caudad from it on each side; transversely depressed in front of caudal border; the short, transverse, submarginal sulcus on each side near beginning of caudal fourth of length.

Coxal pores very small, circular; porigerous surface depressed: 4, 5, 4, 4; 4, 5, 5, 5; 4, 5, 5, 4; 5, 5, 5, 5; 4, 5, 6, 5.

Spines of first to seventh pairs of legs, $\frac{0,0,3,2,2}{0,0,2,3,3}$; of eighth to eleventh pairs, $\frac{0,0,3,2,2}{0,0,3,3,3}$; of twelfth, $\frac{1,0,3,2,2}{0,0,3,3,3}$; of thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,3}$; of penult, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, with one claw. Last four pairs of coxae laterally armed.

Penult legs of male slender; the tibia enlarging distad as usual. (Anal legs missing in ♂ of types).

Claw of female gonopods long and acute, flattened and moderately curved. Inner side of first article proximally bending ectad, well chitinized; joint constricted or broadly channelled across base (Plate 2, fig. 5).

Length 18–22 mm.

Type.— M. C. Z. No. 581, Arizona: Fort Williams, January, 1911. W. M. Wheeler.

Paratypes.— M. C. Z. No. 612, Arizona: Fort Williams, W. M. Wheeler; M. C. Z. No. 611, Grand Canyon, W. M. Wheeler; M. C. Z. No. 610, Huachucha Mts., W. M. Wheeler; M. C. Z. No. 608, 613, Arizona, H. K. Morrison.

Gosibius (Abatobius) montereus, sp. nov.

Plate 1, fig. 5.

Diagnosis.— Dark brown to chestnut, head of nearly same shade. Antennae short, articles twenty-three to twenty-seven. Ocelli fifteen or sixteen in four or five series. Prosternal teeth 2 + 2. Posterior angles of none of the dorsal plates produced. Basal spines of female gonopods 2 + 2. Claws of anal leg two; dorsal spines 1, 0, 3, 2, 0; ventral spines 0, 1, 3, 3, 1. Dorsal spines of penult and thirteenth legs 0, 0, 3, 2, 2 or 1, 0, 3, 2, 2; ventral, 0, 1, 3, 3, 2. Ventral spines of twelfth legs 0, 0, 3, 3, 2; of fourth to eleventh 0, 0, 2, 3, 2; of first, 0, 0, 1, 3, 1. Last one or two pairs of coxae laterally armed. Length of female 15–17 mm.

Description.— Dorsum dark brown to chestnut, darker along a median dorsal line. Head of nearly same shade as dorsal plates or, in paler specimens, darker. Antennae chestnut, uniform. Leg light brown excepting the posterior pairs which, excepting proximally, are dusky, appearing blackish brown or dark chestnut. Prosternum and prehensors chestnut, sometimes more of a dark brown. Venter brown to testaceous.

Body typically strongly narrowed cephalad from the eighth segment, with the first segment distinctly narrowest. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36: 32: 34: 44: 45: 44.

Head suborbicular, widest at level of lateral breaks; wider than long in ratio 18: 17. A semicircular depression in front of the caudal border, its ends continuing cephalad as more obscure and broader diverging furrows or depressions. Punctae fine and sparse.

Antennae short, strongly attenuated distad. Articles, so far as noted, from twenty-three to twenty-seven; decreasing distad from the second, and most moderately short in antennae with the lesser number of articles to very short and crowded in those with the larger number. The ultimate article typically longer than the two preceding ones taken together.

Ocelli fifteen to sixteen in four or five series: 1 + 4, 4, 3, 3; 1 + 1, 4, 4, 3, 2, the ocellus of first series at anterior end of patch; 1 + 4, 3, 3, 3, 2. Single ocellus very much the largest. Ocelli of top series larger than others, the ocelli of others decreasing cephalad and ventrad as usual.

Prosternum 1.54 times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of sinus; 3.7 times the dental line. Median sinus very shallow; wide and semicircular. Teeth 2 + 2; equal in size or inner one of each pair a little the larger, moderate, acute; line of apices recurved. Spines fine and hair-like, inserted caudad of margin close to ectal tooth. Margin rounding out ectad from teeth on each side as usual and then bending back straight ectocaudad.

First dorsal plate widest cephalad, its sides moderately converging caudad; 1.68 times wider than long. Other major dorsal plates showing more or less clearly a longitudinal furrow each side of the middle line from which it diverges a little caudad. Under lens these plates, excepting the first one or two and the fifteenth, those of the posterior region especially, are seen to be roughened, tuberculo-rugose, most strongly so on caudal and lateral portions of plate. Hairs short. Posterior corners of none of the dorsal plates produced; those of ninth, eleventh, and thirteenth rounded or obliquely excised.

Coxal pores small: 3, 3, 3, 3; 3, 3, 4, 3; 3, 4, 4, 3.

Spines of first legs, $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,1,\,3,\,1}$ or dorsal spines 0, 0, 2, 1, 1; of the second, $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,1,\,3,\,2}$ to $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,2,\,3,\,2}$; of the third, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,1,\,3,\,2}$ to $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the fourth to eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the twelfth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the thirteenth and penult, $\frac{0,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$ or, $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$; of the anal, $\frac{1,\,0,\,3,\,2,\,0}{0,\,1,\,3,\,3,\,1}$, claws two.

Last one or two pairs of coxae laterally armed, the spine on penult, when present, small.

Claw of female gonopods long and acute, excavated and strongly curved. Basal spines 2 + 2; long and moderately stout, conically acuminate from very base and uniformly so or a little more abruptly narrowing toward tip. First article conspicuously excavated on mesal side at proximal end. Process of sternite distally, truncate or convex.

Length 15–17 mm. (♀ ♀. The ♂ unknown).

TYPE.— M. C. Z. No. 582, California; Pacific Grove, March, 1913.

PSEUDOLITHOBIUS Stuxberg.

Öfvers. K. vet.-akad. Förhandl., 1875, no. 3, p. 8; Proc. Cal. acad. sci., 1877, **7**, p. 137. Latzel, Myr. Öst.-Ung. Mon., 1880, th. 1, p. 35. Bollman, Bull. 46, U. S. N. M., 1893, p. 164. Verhoeff, Die Chilop., 1907, p. 240. Chamberlin, Pomona college journ. ent., 1910, **2**, p. 369; Can. ent., 1911, **42**, p. 377.

Head with lateral margins essentially continuous, no true breaks occurring.

Antennae short; articles twenty to twenty-two.

Eyes composed of seriate ocelli.

Prosternal teeth 3 + 3 or 4 + 4. Spine near ectal angle of anterior margin, stout and subdentiform.

Pores present on last five pairs of coxae; circular and uniseriate.

Penult legs in male with the fifth article enlarging distad as in Gosibius (Plate **3**, fig. 5). Anal leg with fifth article conspicuously longitudinally furrowed dorsally and bowed ventrad as in some species of Gosibius (Plate **4**, fig. 1).

Dorsal spines of anal legs 1, 0, 3, 2, 2; ventral, 0, 1, 3, 3, 1; (claws in type species 2). Dorsal spines of penult legs 1, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2 or 0, 1, 3, 3, 3. (Third and fifth joints of all legs cephalad of fourteenth with three ventral spines in type species).

Gonopods of male short; uniarticulate.

Claw of female gonopods large and entire. Basal spines stout; (in type species 3 + 3 or 3 + 4). First article broad, inner side well chitinized, constricted at base as usual in the family.

TYPE.— *P. megaloporus* Stuxberg.

This appears to be the only species of the Lithobioidea to bear pores on all the last five pairs of coxae; but in the Henicopidae, Zygethobius agrees in this distribution of the pores.

Fig. 2. Distribution of Pseudolithobius.

Pseudolithobius megaloporus (Stuxberg).

Plate **3**, fig. 4, 5; Plate **4**, fig. 1, 2.

Lithobius megaloporus Stuxberg, Öfvers. K. vet-akad. Förhandl., 1875, no. 2, p. 69; Ann. mag. nat. hist., 1875, ser. 4, **15**, p. 190.

Lithobius (*Pseudolithobius*) *megaloporus* Stuxberg, Öfvers. K. vet.-akad. Förhandl., 1875, no. 3, p. 14; Proc. Cal. acad. sci., 1877, **7**, p. 137.

Pseudolithobius megaloporus Chamberlin, Pomona college journ. ent., 1911, **3**, p. 470; Can. ent., 1911, **42**, p. 381.

Diagnosis.— Dorsum brown, first tergite and caudal borders of others often darker; head darker and more reddish. Antennae short, articles twenty to twenty-two. Ocelli only five to seven in two or three series. Prosternal teeth 3 + 3 or 4 + 4. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. Basal spines of female gonopods 3 + 3 or 4 + 4. Dorsal spines of tenth to anal pairs of legs 1, 0, 3, 2, 2. Ventral spines of anal legs 0, 1, 3, 3, 1; claws two but the accessory one minute. Ventral spines of tenth to penult legs 0, 1, 3, 3, 3 or those of penult sometimes 0, 1, 3, 3, 2; of the others 0, 0, 3, 3, 3 with dorsal spines 0, 0, 3, 2, 2. Last two pairs of coxae laterally armed. Length of female up to 31 mm.; of male up to 41 mm.

Description.— Dorsum brown, often reddish, the first tergite commonly darker and more reddish and the other tergites also frequently darkened along the caudal borders. Head and prosternum with prehensors usually but not always darker and more reddish than the dorsum. Antennae brown to reddish brown, uniform. Venter lighter brown, mostly devoid of any red tinge excepting on caudal segments, sometimes with olivaceous cast. Legs light brown, mostly uniform, the caudal pairs in some a little darker than others.

Body slightly widest at about fifth segment from where it is nearly of the same width caudad to the tenth segment; only little narrowed cephalad of fifth segment, the sides thus being nearly parallel over most of length. Males proportionately more slender than females, being commonly 10 times longer than width of tenth plate, as against 8.5 times in the female.

Head nearly equal in length and breadth but commonly a little wider (20: 19). Widest a little in front of the well-rounded caudal corners from where nearly of same width forward to middle. Strongly margined caudally and along the sides. Commonly elevated in front of suture and complanate behind it; a short median longitudinal

furrow bisecting the elevated portion. Finely punctate and weakly irregularly rugose.

Antennae short. Articles twenty to twenty-two, of which the arrangement is usually about as follows: — the first four long, the seventh and eighth short with the fifth and sixth intermediate; the ninth, tenth, and eleventh long, the twelfth and thirteenth intermediate and the fourteenth and fifteenth very short; the next three long, the nineteenth intermediate, the twentieth and twenty-first short. That is, the antennae thus show several successive divisions beginning with long articles and ending in short ones which are mostly in groups of two, the seventh and eighth and fourteenth and fifteenth especially being normally very short.

Eye area small and elongate in form. Consisting mostly of five to seven, but sometimes up to nine ocelli arranged in two series, occasionally in three series: *e. g.*, 1 + 3, 2; 1 + 3, 3; 1 + 4, 4; 1 + 3, 3, 2. Organ of Tömösvary in outline small.

Anterior portion of prosternum trapeziform, the lateral margins being substraight. Teeth 3 + 3 or 4 + 4, the innermost tooth on each side is typically on side of sinus; outermost tooth on each side a little more widely removed. Spine stout and conical, inserted a little proximad of anterior margin on ventral side. Prosternum 1.66 times wider than long. Chitinous lines strongly marked cephalad, but fading out caudad.

Dorsal plates depressed longitudinally immediately mesad of turned up lateral edges, median portion not strongly convex, caudal portion depressed. A weak longitudinal furrow each side of middle diverging from its mate caudad; from its caudal end or near it a second furrow diverges from it cephalad. Surface moderately uneven or rugose. The major plates unusually long, longer relatively in the male than in the female as shown by the following measurements:—

	Male		Female	
Tergite No.	Length	Width	Length	Width
1	2.6 mm.	4 mm.	2 mm.	3.1 mm.
3	4	4.1	3	3+
5	4.9	4.2	3.1	3.2
7	4	4.1+	2.2	3.2
8	4.1+	4.1+	3	3.2
10	5	4.1	3.2	3.2
12	5	4	3+	3+

(The total length of male measured 41 mm.; of female 27 mm.).

The ventral plates are also long and similarly relatively longer in the male than in the female. Measurements from the same two individuals are as follows: —

	Male		Female	
Sternite No.	Length	Width	Length	Width
1	1.1 mm.	1 mm.	.6 mm.	1 mm.
2	2	1.6	1.1	1.8
3	2.4	2.1	1.4	2
4	2.6	2.1	1.7	2
5	2.8	2.7	1.7	2.1
6	3−	2.9	1.9	2.2
7	3.1−	2.3	2.1	2.3
8	3.1	2.7	2.1	2.2
9	3.1	2.9	2.1	2.3+
10	3.2	3	2.1	2.3
11	3.2	2.8	1.6	2.1
12	3	2.8	1.3	2.1
13	2.9	3+	1.2	2.1
14	1.5	2.1	1.1	2

From this table it will be seen that, excepting the last few, the sternites in the male are all longer than wide whereas in the female they are wider than long. The ventral plates are bowed ventrad, from end to end; the anterior end of outer more anterior plates more strongly bent dorsad and making a distinct angle, which in some is nearly right, with adjoining portion of plate. Depressed within each lateral edge. Median and caudal plates with a median and two lateral longitudinal sulci which do not extend over anterior portion of plate; especially the median sulcus disappearing in more cephalic plates. Plates irregularly roughened and densely punctate.

Coxal pores moderately large, circular or a little transversely elongate or elliptical; their edges elevate and strongly chitinized; porigerous surface depressed, the bordering rims well chitinized: 4, 4, 4, 4, 4; 5, 5, 5, 5, 5; 5, 5 (6), 5, 5, 5.

Spines of first to ninth legs, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 3}$; of the tenth to thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 3}$; of the penult, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 3}$ or with ventral spines 0, 1, 3, 3, 2, claws two; of anal, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 1}$, claws two but the accessory one very small. Last two pairs of coxae laterally armed.

Anal and penult legs in female slender, their prefemora, as also in the male, strongly laterally compressed, the immediately preceding ones also showing this compression, broader dorsally than ventrally,

a section being wedge-shaped. In the male the tibia of anal legs is widened and is conspicuously bowed ventrad, furrowed longitudinally above (Plate **4**, fig. 1). In the penult legs of male the tibia is elevated over distal half of length (Plate **3**, fig. 5).

Gonopods of male short and broad, rounded; bristles long.

Claw of female gonopods very long, strongly curved; blackish. Basal spines 3 + 3 or 3 + 4; conically acuminate from base or near it, decreasing in size from outermost to innermost. Proximal article broad, constricted at base (Plate **3**, fig. 4).

Length of males up to 41 mm.; of females up to 31 mm. A male 30 mm. long has antennae 11 mm. and anal legs (exclusive of coxae) 12.5 mm. long.

Agenitalis.— Stuxberg's original description was manifestly based upon very young specimens, these being of the *agenitalis* stage as indicated by several points in his description. The original description, rearranged, is as follows:—

Lamina cephalica obcordata, hirsuta, margine postico subrecto, elevato, parte antica sulco profundiore a postico sejuncta.

Antennae perbreves, articulis 19–20 compositae, ex quibus ultimus longissimus, tres antecedenta junctos longitudine aequans, 2°, 3°, 8°, 9°, 10°, 14°, 15°, 16° mediocribus, ceteri latitudine duplo majore quam longitudine minime.

Oculi ocellis 7 magnis in 2 series (1 + 3, 3) digestis.

Coxae pedum maxillarium secundi paris dentibus 2 + 2–3 + 3 crassis acumine nigris armatae, sinu mediano lato, haud profundo.

Scuta dorsualia 9^{um}, 11^{um}, 13^{um} angulis productis, 2^{um}, 4^{um}, 6^{um}, 7^{um} margine portico recto, 1^{um}, 9^{um} convexo, 3^{um}, 5^{um}, 8^{um}, 10^{um}, 12^{um}, 14^{um} sinuato.

Scuta ventralia omnia, praesertim marginibus, setis longis, magnis vestito, medii corporis sulco profundiore longitudinali mediano laterali minore et breviore, ex angulo postico laterali excurrente.

Pori coxales 2, 2, 1, 1, 1 maximi, rotundi.

Pedes primi paris calcaribus 1, 1, 1. Pedum analium articulus primus calcaribus nullis, setis 2 longioribus, altera ventrali, altera laterali armatus.

Pedes anales perbreves, longitudinem antennarum non assequentes, incrassati, ungue singulo, calcaribus 0, 1, 1, 0 armati.

Color dorsi testaceo-brunneus, laminis ventralibus pedibusque pallidioribus.

Longitudino corporis 12 mm.; antennarum 4 mm.; pedum analium 2.5 mm.

Type Locality. — California: near San Francisco (G. Eisen). Also taken in California at Sausalito, (M. C. Z., No. 586, 587); Oroville, (M. C. Z. No. 584, 585).

The type locality, "near San Francisco", was probably Sausalito, from where numerous specimens have been examined. I found the species to be very common about Oroville. In April it occurred under stones and other objects lying in open treeless areas. They seemed slow to take alarm, often remaining quite unconcerned after stones had been removed from over them and they themselves touched or jarred, and appearing generally more sluggish than most related forms. The conspicuous difference in size and form of the sexes in this species is noteworthy.

Guambius Chamberlin.

Ann. Ent. soc. Amer., 1912, **5**, p. 144.

Head with lateral marginal breaks.

Antennae short or moderate; articles from twenty-four to thirty-five.

Eyes composed of seriate ocelli; single ocellus enlarged.

Prosternal teeth 2 + 2; sinus of good size, mostly between V- and U-shaped. Spines always more slender than the teeth, varying from truly spiniform to the more slender, distally bristle-like form.

Either posterior angles of ninth, eleventh, and thirteenth dorsal plates produced (Sibibius) or those of eleventh and thirteenth, at least of latter, more weakly produced (Guambius *sens. str.*).

Anal legs in the male with the fourth article more or less conspicuously crassate and longitudinally furrowed above; the fifth article commonly much less crassate, somewhat elevated along dorsal side but not conspicuously modified. Fifth article of penult legs obliquely planate or excised at distal end above and there bearing a conspicuous lobe or crest of characteristic form (Plate **4**, fig. 5; Plate **5**, fig. 3, 5, 6; Plate **6**, fig. 1).

Dorsal spines of anal legs 1, 0, 3, 2, 1 or 1, 0, 3, 2, 2 (Sibibius) to 0, 0, 3, 1, 0 or 1, 0, 3, 1, 0 (Guambius *sens. str.*); ventral 0, 1, 3, 3, 1 to 0, 1, 3, 2, 0; claws two or three. Dorsal spines of penult legs 1, 0, 3, 2, 2 or 0, 0, 3, 2, 2 (♀) and 7, 0, 3, 2, 1 or 0, 0, 3, 2, 1 (♂) (Sibibius) to 1, 0, 3, 1, 1 or 0, 0, 3, 1, 1 (Guambius *sens. str.*); ventral, 0, 1, 3, 3, 2 or 0, 1, 3, 3, 1; claws three. Dorsal spines of thirteenth

Fig. 3. Distribution of Guambius.

legs 1, 0, 3, 1, 1 or 0, 0, 3, 1, 1 to 0, 0, 3, 2, 2; of twelfth 0, 0, 3, 2, 2 to 0, 0, 3, 1, 2. Last one or two pairs or none of posterior coxae laterally armed.

Gonopods of male uniarticulate.

Claw of female gonopods large and strictly entire. Basal spines stout, 2 + 2. Mesal side of first article well chitinized; article constricted or furrowed about base, commonly appearing excavated on mesal side at proximal end as usual in the family.

Length 9 to 15.5 mm.

TYPE.— *G. euthus* (Chamberlin).

Sibibius is removed from Arenobius, under which it was originally placed as a subgenus, chiefly because of the pronounced differences in the prosternum and in the modifications of the posterior legs. It is united tentatively with Guambius because of close agreement in the secondary sexual characters of the males, although the differences in the spining of the legs and in the angulation of the dorsal plates with other lesser ones make it seem likely that, with more thorough acquaintance with the chilopod fauna of the southern United States and Mexico, it will be found advisable or necessary to treat it as a separate genus. The distribution of the known species is indicated on (Fig. 3).

Key to Subgenera and Species of Guambius.

a. Posterior angles of only the eleventh and thirteenth dorsal plates produced, or production of these also but slight; dorsal spines of anal legs 0, 0, 3, 1, 0; of penult, 0, 0, 3, 1, 1.
Guambius Chamberlin *sens. str.*

b. Ventral spines of penult legs 0, 1, 3, 3, 2.
G. euthus (Chamberlin).

bb. Ventral spines of penult legs 0, 1, 3, 3, 1 or 0, 1, 3, 2, 1.

c. Ventral spines of first legs, 0, 0, 0, 0, 1.
G. pinguis (Bollman).

cc. Ventral spines of first legs 0, 0, 1, 1, 1 or 0, 0, 1, 2, 1.

d. Trochanter of thirteenth legs armed; ventral spines of anal legs 0, 1, 3, 2, 1 or 0, 1, 3, 3, 1.
G. mississippiensis (Chamberlin).

dd. Trochanter of thirteenth legs unarmed; ventral spines of anal legs 0, 1, 3, 2, 0.....*G. curtior,* sp. nov.

aa. Posterior angles of ninth, eleventh, and thirteenth dorsal plates

produced; dorsal spines of anal legs 1 (10), 0, 3, 2, 1; of the penult, 1 (10), 3, 2, 2 or 1 (10), 3, 2, 1. . . *Sibibius* Chamberlin.

b. Articles of antennae 30–35; ventral spines of thirteenth legs normally 0, 0, 3, 3, 2; claws of anal legs two
G. coloradanus (Chamberlin).

bb. Articles of antennae mostly 24–26; ventral spines of thirteenth legs normally 0, 1, 2, 3, 2; claws of anal legs three.
G. oedipes (Bollman).

Guambius (Guambius) curtior, sp. nov.

Plate 5, fig. 6; Plate 6, fig. 1, 2.

Diagnosis.— Dorsum testaceous, caudal plates darker; head deep cherry-red. Antennae very short; articles twenty-five. Ocelli nine or ten in three series. Body about 6.3 times longer than width of tenth plate. First tergite two times as wide as long. Anal leg of male crassate, the fourth joint particularly so. Penult legs more slender, the fourth joint most inflated; crest of fifth article subtriangular in lateral view, highest distad (Plate 5, fig. 6). Anal legs with two claws; dorsal spines 0, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0. Dorsal spines of penult legs 0, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1; claws two. Dorsal spines of thirteenth legs 0, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2. Ventral spines of twelfth legs 0, 0, 2, 3, 2. Dorsal spines of second legs 0, 0, 1, 2, 1; ventral same or 0, 0, 1, 1, 1. None of coxae armed. Length 8.5 mm. (male type).

Description.— Dorsum testaceous, posterior plates and caudal margins of same anterior ones darker, more reddish. Head deep cherry-red. Antennae similar to head proximally, lighter distally. Prosternum dark but less reddish than the head. Venter pale testaceous, the anterior and especially the posterior plates darker. Legs pale testaceous, the posterior pairs more densely pigmented, more or less orange.

Body wide, relative to length, being in the type 6.3 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 30: 27: 30: 37: 37: 33.

Head as wide as long or only slightly wider. Of uniform width between eyes and marginal breaks. Hairs short and sparse.

Antennae very short; articles twenty-five short and decreasing distad as usual, closely united. Hairs short.

Ocelli nine or ten in three series: 1 + 4, 3, 2; 1 + 3, 3, 2.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2 times width at level of bottom of mesal incision; 3.1 times the dental line. Median sinus rather small, widely V-shaped with sides somewhat concave. Teeth acute, subequal; line of apices recurved. Tubercle distinct, contiguous with base of ectal tooth; spine slender, bristle-like.

First dorsal plate 2 times wider than long; sides nearly straight, considerably diverging cephalad, rounded only at ends. Eleventh and thirteenth plates with the caudal corners distinctly produced; ninth plate with the corners rectangular or a little obliquely excised.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,1,1}$ or ventral spines 0, 0, 1, 2, 1; of the second, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the fourth and fifth, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the sixth and seventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the eighth, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the ninth, $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the tenth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the eleventh and twelfth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the penult, $\frac{0,0,3,1,0}{0,1,3,3,1}$; claws two; of the anal, $\frac{0,0,3,1,0}{0,1,3,2,0}$; claws two. None of the cóxae at all armed.

Anal legs of male with the fourth joint in particular strongly inflated and conspicuously longitudinally furrowed dorsally; fifth joint uniformly rounding up dorsally as usual; tarsi slender. Penult legs more slender than the anal, the fourth joint not relatively more inflated than the adjoining ones; fifth article obliquely dorsocaudally complanate or excised at distal end and their bearing a longitudinally placed, laterally compressed low crest, the dorsal edge of which begins proximally at surface of joint and rises to distal end, in lateral view being thus subtriangular (Plate **5**, fig. 6).

Gonopod of male bearing about four bristles.

Length of type (♂) 8.5 mm.; antennae 2.5 mm.; width of tenth plate 1.35 mm.

Type.— M. C. Z., No. 605, Mississippi: Gulfport.

Guambius (Guambius) mississippiensis Chamberlin.

Plate **5**, fig. 4, 5.

Ann. Ent. soc. Amer., 1912, **5**, p. 144.

Lithobius oedipes Chamberlin (non Bollman), Ann. Ent. soc. Amer., 1911, **4**, p. 43.

Diagnosis.— Testaceous to clear brown; head cherry-red to almost black. Antennae short; articles twenty-five or twenty-six. Ocelli nine to fifteen in three or four series. Body 7.25 to 7.85 times

longer than width of tenth plate. First dorsal plate near 1.8 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates more or less produced. Anal legs of male strongly crassate, the prefemur elevated and deeply longitudinally furrowed. Penult legs similarly crassate; tibia with lobe (Plate 5, fig. 5). Claws of anal legs two; dorsal spines 0, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1–0, 1, 3, 2, 1. Dorsal spines of penult legs 0, 0, 3, 1, 1; ventral 0, 1, 3, 3, 1–0, 1, 3, 2, 1; claws two. Dorsal spines of thirteenth legs, 0, 0, 3, 2, 2; ventral 0, 1, 2, 3, 2. Ventral spines of twelfth legs, 0, 0, 2, 3, 2. Dorsal spines of second legs 0, 0, 1, 2, 1; ventral the same. Dorsal spines of first legs 0, 0, 1, 1, 1; ventral, 0, 0, 1, 2, 1. None of coxae armed. Length 10–14 mm.

Description.— Dorsum dilute chestnut with the caudal plates and a median longitudinal line somewhat darker. Head and antennae dark chestnut, the latter paler distad. Venter testaceous, darker brown caudad. Prosternum and prehensorial feet nearly the same as head. Legs testaceous, the caudal pairs a little darker.

Body strongly narrowed from eighth plate cephalad to the first which is clearly narrower than the third; eighth and tenth plates nearly equal in width, much wider than the head, the latter being typically even a little narrower than third plate, widths of head and of first, third, eighth, tenth, and twelfth plates as 31: 29: 32: 41: 42: 39.

Head equal in length and width or only slightly wider (36: 35 or 34.5). Widest at marginal interruptions between which and the eyes the diameter is nearly uniform, the sides caudad of this convex and strongly converging; median portion of caudal margin straight. Rather strongly transversely furrowed or depressed immediately in front of caudal marginal thickening, the furrow extending entirely across the head and continuous with the caudal end of a wide longitudinal furrow on each side. A short transverse sulcus a little cephalad of and parallel with median part of frontal suture, a median longitudinal sulcus extending forward from this transverse one and showing or passing through a deeper pit-like depression at middle of length. Smooth and shining, or only very obscurely uneven.

Antennae very short, reaching only to the fifth or sixth body-segment; strongly attenuated. Composed of twenty-five or twenty-six articles of which the second is longest, those immediately following not abruptly shorter but only very gradually decreasing in size distad.

Ocelli ten to fourteen in number arranged in three or four series: *e. g.*, 1 + 3, 3, 3; 1 + 4, 4, 3; 1 + 3, 3, 2; 1 + 5, 4, 3, 1; 1 + 4, 3, 2, 1. The single ocellus much the largest, subvertically elliptic or oval.

Prosternum 1.5–1.55 times wider than long. Distance between chitinous spots near 2.23 times width at level of bottom of sinus; 3.35 times dental line. Teeth subequal, acute, with line of apices manifestly recurved. Median sinus wide and deep with its sides concave. Tubercle of spine well developed, contiguous with base of ectal tooth; spine slender and bristle-like, not much longer than the teeth.

First dorsal plate with sides moderately diverging cephalad; 1.8 times wider than long. Plates under lens appearing finely and in part only obscurely roughened, the roughening as usual more distinct caudad. Major plates excepting the seventh, showing distinctly the short transverse submarginal sulcus on each side, the seventh plate showing a similar sulcus near each caudal corner and one near each anterior corner as well. Most of the major plates marked with two distinct longitudinal furrows which diverge more or less from near the caudal margin cephalad, these furrows in some distinct only in front of the submarginal transverse marks. Posterior angles of eleventh and thirteenth plates a little produced, those of the others rounded or obliquely excised.

Most ventral plates with a rather deep longitudinal furrow toward each side but mesad of a weaker submarginal furrow. The usual median longitudinal furrow with also the transverse depression cephalad of caudal margin more or less evident.

Coxal pores small or moderate: 3, 4, 4, 3; 4, 5, 5, 5; 5, 5, 5, 5; 5, 5, 6, 4; 5, 5, 6, 5.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the second, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the third same as second to, $\frac{0,\ 0,\ 1,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 1}$; of the fourth, $\frac{0,\ 0,\ 1,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$ or ventral spines 0, 0, 2, 2, 1; of fifth same as fourth or ventral spines may also be 0, 0, 2, 2, 2; of the sixth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 1}$ or ventral spines 0, 0, 2, 2, 2; of the seventh, $\frac{0,\ 0,\ 1,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$ or dorsal spines 0, 0, 2, 2, 2; of the eighth and ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the tenth and eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$ or ventral spines 0, 0, 2, 3, 2; of the twelfth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$ or ventral spines 0, 0, 2, 3, 2; of the thirteenth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 2,\ 3,\ 2}$; of the penult, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 1}$ or ventral spines 0, 1, 3, 2, 1, claws 2; of the anal, $\frac{0,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$ or ventrad 0, 1, 3, 2, 1, claws two. None of the coxae armed either above or laterally.

Gonopods of male wide, truncate distad, flattened in an ectoventral dorsomesal direction; bearing a few short bristles in a row along distal edge of ventral side.

Claw of female gonopods long and moderately stout, considerably

curved, subacute but apex narrowly rounded. Spines 2 + 2, the outer clearly longer than the inner, acuminate from base. First article with inner side sharply defined and strongly chitinized edge; considerably curving ectad proximally. Median process of sternite long and acutely acuminate, strongly chitinized.

Length 10 to 14 mm. A male (type) 12.5 mm. long has antennae 5 mm. long and width of tenth plate 1.7 mm. The widths of head and of first, third, eighth, and tenth plates are to each other as 18: 17: 19: 24: 24.

Type.— M. C. Z., No. 604, Mississippi: Byram, July, 1910.

Paratypes.— M. C. Z., No. 603, Mississippi: Byram, July, 1910.

Guambius (Guambius) euthus (Chamberlin).

Lithobius euthus Chamberlin, Proc. Acad. nat. sci. Phil., 1904, p. 652.

Diagnosis.— Dorsum brown, first and last plates more reddish; head darker reddish brown. Antennae short; articles twenty-five to twenty-eight. Ocelli about eight in three series. First dorsal plate 1.72 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates produced weakly. Dorsal spines of anal legs, 0, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 0 or 0, 1, 3, 2, 0; claws 2, the accessory one long. Dorsal spines of penult legs, 0, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; claws three. Dorsal spines of thirteenth, 0, 0, 3, 2, 2; ventral, 0, 1, 3, 3, 2. Ventral spines of twelfth legs, 0, 0, 2, 3, 2. Dorsal spines of second legs, 0, 0, 2, 2, 1; ventral, 0, 0, 2, 3, 1. Dorsal spines of first legs, 0, 0, 2, 1, 1 or 0, 0, 2, 2, 1; ventral, 0, 0, 1, 1, 1 or 0, 0, 1, 2, 1. None of coxae armed. Length 12–15 mm.

Description.— Dorsum brown, the first and the last tergites darker and more reddish.

Head darker reddish brown or chestnut. Antennae brown or like head, paler distad. Prosternum and prehensors like head. Venter brown. Legs light brown.

Body distinctly narrowed cephalad to the first plate which is clearly narrower than the head and than the third plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 76: 69: 76: 82: 80: 77.

Head wider than long (43: 38.) Caudal margin straight or nearly so. Narrowed from breaks caudad; moderately widely rounded cephalad.

Antennae short; articles twenty-five to twenty-eight, moderate.

Ocelli near eight in three series: *e. g.*, 1 + 3, 3, 2, which is the commonest arrangement.

Prosternal teeth 2 + 2; the mesal one of each pair distinctly larger than the outer and the line of apices mostly a little procurved. Sinus typically between semicircular and U-shaped. Spine in usual position, stouter than the bristles, acute. Prosternum 1.45–1.5 times wider than long. Distance between chitinous spots 2+ times wider than width at level of bottom of sinus; 3 times the dental line.

First dorsal plate 1.72 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates weakly produced but the processes varying considerably in distinctness and size.

Coxal pores small; mostly 4, 4, 4, 4; also 4, 5, 5, 4 and 5, 5, 5, 4, etc.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,1,1}$ to $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,1}$; of the third, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fourth to twelfth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{0,0,3,2\,(1),2}{0,1,3,3,2}$; of the penult, $\frac{0,0,3,1,1}{0,1,3,3,2}$, claws three, of the anal, $\frac{0,0,3,1,0}{0,1,3,3,0}$ or ventral 0, 1, 3, 2, 0, claws two, the accessory being nearly as long as the principal one. None of the coxae at all armed.

Claw of female gonopods of usual type; long, acutely pointed, moderately curved, mesally hollowed out and rather thin. Spines 2 + 2, long and stout, acutely and evenly acuminate from very base; the inner spine shorter than the outer and also attached farther proximad so that the actual difference is exaggerated in appearance. First article with the mesal side strongly chitinized as usual, proximally bent ectad or appearing excavated.

Length 12–15 mm.

Type.— M. C. Z., No. 606, Texas: Austin, J. H. Comstock. The types are all females.

Guambius (Guambius) pinguis (Bollman).

Lithobius pinguis Bollman, Ent. Amer., 1888, **4**, p. 7; Bull. 46, U. S. N. M., 1893, p. 79.

The original description, rearranged, is as follows: —

Dark chestnut-brown. Head and antennae dark. Legs paler.

Slender; not smooth; sparsely pilose.

Head wider than long (3.5:3). [The ratio given, possibly including prehensors, is doubtless too great]. Polished, not pilose.

Antennae short. Articles twenty-two to twenty-four, short.

Ocelli four to six arranged in two or three series.

Prosternal teeth 2 + 2.

Posterior angles of all the dorsal plates straight.

Coxal pores 3, 3, 3, 2 to 4, 4, 4, 4, round.

Spines [ventral] of the first pair of legs, 0, 0, 1; of the penultimate pair 1, 3, 2, 1 to 1, 3, 3, 1; of the anal pair, 1, 3, 2, 0.

Posterior legs short.

Claw of female genitalia [gonopods] entire; stout and much curved. Spines strong, subequal.

Length of body 9–10 mm.

Type Locality.— Arkansas: Little Rock (Bollman).

Based upon three female specimens.

A much rubbed specimen (M. C. Z., No. 602), referable with some doubt to this species, was secured by the writer at Hudsonville, Miss.

Guambius (Sibibius) coloradanus (Chamberlin).

Plate 4, fig. 3–5; Plate 5, fig. 1.

Arenobius coloradanus Chamberlin, Ann. Ent. Soc. Amer., 1912, 5, p. 141.

Diagnosis.— Testaceous to dark brown and dull chestnut; head of same color. Antennae short, articles thirty to thirty-five. Ocelli nine to twelve in three series. Anal legs of male rather slender but tibia more crassate. Penult legs with the usual crest (Plate 4, fig. 5). Dorsal spines of anal legs 1, 0, 3, 2, 1; claws two. Dorsal spines of penult legs 1(0), 0, 3, 2, 2 (♀) or 1(0), 0, 3, 2, 1 (♂). Ventral spines of thirteenth legs 0, 0, 3, 3, 2. Ventral spines of twelfth legs 0, 0, 3, 3, 2; of eleventh, 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 2, 1, 1; ventral, 0, 0, 1, 2, 1 or 0, 0, 1, 3, 1. Last pairs of coxae laterally armed. Length 12 to 15 mm.

Description.— Dorsum from testaceous to dark brown and dull chestnut with the posterior plates and the first one usually not at all darkened. Head mostly the same color as dorsum or very nearly so, or somewhat more reddish. Antennae concolorous with head, pale distad. Venter from yellow or testaceous to dark brown, the caudal plates usually a little darker. Prosternum and prehensorial feet of same color as head or nearly so. Legs of same color as adjacent portion of venter.

Head widest at level of marginal interruptions; clearly wider than long (11: 10); caudal margin straight. Depressed or furrowed

parallel with frontal suture a little cephalad of the latter, from this furrow a median longitudinal furrow extending toward anterior margin. Two, usually clearly impressed, longitudinal furrows on caudal region of head, one a little each side of the middle and the two united in front of the posterior margin by a transverse furrow. Smooth and shining.

Antennae short or very short, reaching the sixth or seventh segment; articles thirty to thirty-five, the second very long with those more distad much shorter, cylindric, subuniform or, more usually, with longer articles occurring singly at intervals among the shorter ones, in general decreasing in size distad. Hairs of medium length.

Eyes composed mostly of from nine to twelve ocelli arranged in three series: *e. g.*, 1 + 3, 3, 2, 1 + 4, 3, 3, 1 + 4, 4, 3. The single ocellus much largest, subvertically elliptic or oval.

Dorsal plates all very finely or obscurely roughened, appearing smooth and shining to the naked eye; usually no furrows distinctly developed excepting the usual depression or furrow immediately within the caudal and lateral margins and on some the short transverse mark on each side near margin at about one third length of plate from caudal margin. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced; posterior angles of other minor plates rounded or obliquely excised.

Ventral plates all punctate and finely roughened; impressed with three longitudinal furrows of which the median is most distinct, the latter on some of the more posterior plates ending caudad in a deeper pit or depression about one third the length of plate from caudal edge; mostly with a rather wide transverse depression or furrow caudad of middle of plate. Sometimes an additional longitudinal furrow showing on each side between the median and the lateral, the caudal end often curving mesad to unite with its mate at middle; this furrow often more or less united with the lateral one. The last several plates sometimes with furrows very obscure or practically absent.

Prosternum about 1.6 times wider than long. Teeth 2 + 2, small acute. Median incision wide and moderately deep, its sides concave. Spine on each side well ectad of outer tooth, much more slender than teeth but stouter at base than neighboring hairs, bristle-like distad.

Coxal pores circular, well separated; in number arranged as follows: — 3, 4, 4, 3; 3, 4, 4, 4; 4, 5, 5, 5.

Coxae of anal legs armed laterally and dorsally; other coxae seemingly unarmed. Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,2,1}$ or, $\frac{0,0,2,1,1}{0,0,1,3,1}$; of the second

and third, $\frac{0,0,2,2,1}{0,0,2,3,1}$; of the fourth, $\frac{0,0,3,2,2}{0,0,2,3,1}$ or, occasionally, $\frac{0,0,3,2,1}{0,0,2,3,1}$; of the fifth, $\frac{0,0,3,2,2}{0,0,2,3,1}$; of the sixth to the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth and thirteenth, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the penult, $\frac{0,0,3,2,2}{0,1,3,3,2}$, in the female, or, $\frac{0,0,3,2,1}{0,1,3,3,2}$ in the adult male, each having claw armed with two accessory claws; of anal, $\frac{1,0,3,2,1}{0,1,3,3,1}$, the dorsal spine of tibia and also outer one of femur readily lost so that spining may appear thus, $\frac{1,0,3,2(1)0}{0,1,3,3,1}$, two accessory claws present as in the penult pair. In the female the anal legs are short and very slender, decreasing gradually in diameter from the femur distad, the tibia being intermediate in diameter between femur and first tarsal article as the latter is between tibia and second tarsal article; tibia rather weakly longitudinally furrowed along dorsal surface. Penult legs similar to anal except for smaller size. In the male the anal legs are also rather slender but the tibia is crassate, being fully as thick as the femur and being widest at distal end and abruptly thicker than the first tarsal joint, its dorsal surface shallowly depressed, a longitudinal dorsal furrow also present on femur and prefemur, that of the latter less distinct. Penult legs of male also slender, with joints dorsally longitudinally furrowed; the tibia obliquely excised at dorsocaudal corner of distal end and bearing at this place a small, flattened lobe or crest which is transverse to the axis of the joint, this lobe bearing a few short hairs but nothing like the brush in *Arenobius manegitus*.

Gonopods of male relatively wide, flattened, truncate distad; bearing mostly 4–6 bristles in a transverse row along distal edge of ventral side.

Gonopods of female with claw entire, long and stout, acutely pointed, considerably curved, darkened distad. Basal spines 2 + 2, subequal or with the inner in some individuals considerably shorter, stout; in ventral view acutely conical in outline. Articles, especially the second and third, glabrous or nearly so on ventral and mesal surfaces, but clothed with a moderate number of bristles on ectal and dorsal surfaces.

Body rather slender being about 7.5 times as long as width of tenth plate; conspicuously attenuated cephalad from eighth plate, with the first plate much narrower than the third. Width of head, first, third, eighth, and tenth dorsal plates to each other as 40, 33, 37, 47 and 47, the eighth and tenth plates being equal and manifestly considerably wider than the head.

Length from 12 to 15 mm. A male 13 mm. has antennae 5 mm.

long and anal legs exclusive of coxa, *circa* 4.8 or 5 mm. long, with the tenth plate about 1.7 mm. wide.

Types.— M. C. Z., No. 599, Colorado: Manitou, August, 1910. Also taken at Durango, Colorado, C. F. Baker, 1894, (M. C. Z., No. 600).

Guambius (Sibibius) oedipes (Bollman).

Plate 5, fig. 2, 3.

Lithobius oedipes Bollman, Ent. Amer., 1888, 4, p. 8.

Diagnosis.— Brown to somewhat chestnut, the posterior plates sometimes with a median longitudinal dark stripe. Head darker than dorsum, chestnut. Antennae short; articles twenty-four to twenty-six. Ocelli nine to eleven in three series. Body but little more than six times longer than width of tenth plate. In male fourth article of anal legs very strongly crassate, with a conspicuous bunch of long hairs at distal end (Plate 5, fig. 2). Penult legs much more slender; fifth article with excision and crest (Plate 5, fig. 3). Dorsal spine of anal legs 0, 0, 3, 2, 1, claws three. Dorsal spines of penult legs 0, 0, 3, 2, 1 (♂) or 0, 0, 3, 2, 2 (♀). Ventral spines of thirteenth legs 0, 1, 2, 3, 2. Ventral spines of twelfth legs 0, 1, 2, 3, 2 or 0, 0, 2, 3, 2; of the eleventh 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 2, 1, 1; ventral, 0, 0, 2, 1, 1. None of the coxae armed.

Length 12.5 to 15.5 mm.

Description.— Dorsum brown to somewhat chestnut, the latter color especially affecting the first and the last few plates; the posterior plates may have a median longitudinal dark mark which may be either broad or narrow or with one or more longitudinal dark lines each side of the middle. Head darker than the dorsum, chestnut. Antennae chestnut, paler distad. Prosternum deep brown, the prehensors much paler. Venter testaceous to rather dark brown, the posteriorly darker and sometimes decidedly reddish from the middle of the body caudad, the darker area usually showing a pale median area. Legs brownish yellow to light brown, the posterior pairs darker proximally, but distally, especially distad of fourth article, light, bright yellow or orange.

Body proportionately broad, being only about 6.1 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 47: 43: 50: 61: 64: 58.

Head considerably wider than long (47:42). Of usual shape. Surface punctate, only obscurely uneven.

Antennae short, composed of twenty-four (♀) or twenty-six (♂) articles which are short.

Ocelli nine to eleven, nearly uniformly in three longitudinal series or partially in four: 1 + 2, 3, 3; 1 + 3, 3, 2; 1 + 3, 4, 3; 1 + 1, 3, 3, 1. The single ocellus ovate. The first ocellus of top row usually conspicuously larger than other seriate ocelli.

Prosternum wider than long in about ratio 45:26, being thus about 1.7+ times wider than long. Distance between chitinous spots 2.26 times as great as width at level of mesal incision, 3.4 times as great as length of the dental line. Teeth 2 + 2, equal, moderately large, acute, and rather pale. Tubercle of spines well developed, situated immediately ectad of outer tooth; the spine rather stout but much more slender than the teeth.

All dorsal plates excepting the first finely roughened, the first being smooth and shining like the head. Posterior angles of ninth, eleventh and thirteenth acutely produced.

Median ventral furrow extending across entire plate in each case, broad and rather deep. Lateral ventral furrows less distinct. All ordinarily much weaker on posterior plates.

Coxal pores circular, moderate: *e. g.*, 5, 5, 5, 4–6, 5; 5, 4; 6(5) 5, 5, 5; 3, 5, 4, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the third and fourth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fifth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,1,2,3,2}$ or, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{0,0,3,2,2}{0,1,3,3,2}$; of the fourteenth or penult, $\frac{0,0,3,2,1}{0,1,3,3,2}$ (♂) or, $\frac{0,0,3,2,2}{0,1,3,3,2}$ (♀), the claws three, both accessory claws very distinct; of the anal, $\frac{0,0,3,2,1\,2)}{0,1,3,3,1}$, claws three, the outer accessory very small and slender. No coxal spines could be detected in the types.

In the male the third article of the anal legs is clavately thickened and ridged along mesal or dorsomesal surface. Fourth article very strongly crassate; marked on dorsomesal surface with a broad deep longitudinal furrow which bends somewhat obliquely more ventrad from proximal to distal end; bordered along entire dorsal or ectal side by a very conspicuously elevated thin ridge, which near the beginning of its distal fourth, bears a brush of long hairs; this brush projects mesad; scattered similar hairs also occur on the edge more proximad; the furrow is also bordered on the mesal and more ventral side with a lower thin ridge which bears sparsely along its edge long hairs. Fifth article or tibia abruptly much more slender than the fourth (Plate 5, fig. 2).

Penult legs in the male with third and fourth articles much more slender than in the anal, the fifth not greatly more slender than the fourth. Fourth article but little enlarged, dorsally weakly longitudinally furrowed. Fifth article or tibia obliquely excised at distal end on mesal side and bearing toward dorsal edge of excised surface a thin keel-like triangular lobe or crest which is long in comparison with height, the highest end being distad, and projects mesad or dorsomesad. Crest not pilose.

Gonopods of male of usual shape, flattened and parallel-sided, bristles long.

Proximal articles of female gonopods strongly chitinous and conspicuously excavated mesally at base. Claw long and strongly curved, acutely pointed, entire. Spines 2 + 2, large and broad, flattened distad, the outer of about equal breadth to beginning of distal fourth where it narrows to a rounded point, the outer side of tip longer and more oblique than the inner. Inner spines set nearly at right angles to the outer, a little smaller.

In a male 15 mm. long the antennae are 5.5 mm. long and the anal legs 6 mm. The tenth plate is 2.34 mm. wide. A second male is 12.5 mm. long; and a female 15.5 mm. long.

Locality.— Arkansas: Little Rock.

The description above is based upon the type specimens. Bollman gives the length of the male as 15.4 mm. and that of the female as 20 mm., but this is an error.

Arenobius Chamberlin.

Can. ent., 1912, **43**, p. 177.

Head with marginal breaks present but small or incomplete.

Antennae short; articles normally twenty.

Eyes consisting of seriate ocelli; single ocellus enlarged.

Prosternal teeth 2 + 2, small. Spines very stout and tooth-like. No true median sinus present.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates, produced.

Pores on only last four pairs of coxae; uniseriate.

Anal legs of male crassate; fourth and fifth articles dorsally, ectally and mesally longitudinally furrowed, the dorsal furrows of fifth article most conspicuous and in type limited by marginal pilose

ridges. Penult legs more strongly crassate; mesal furrow of tibia deep, conspicuously deepened and widened distally and in type embracing a lobe bearing a conspicuous brush of long hairs. Dorsal spines of anal legs in both male and female normally 1, 0, 3, 2, 1, occasionally only 1, 0, 3, 2, 0; ventral 0, 1, 3, 3, 1; claws two. Dorsal spines of penult legs in female 1, 0, 3, 2, 2, in male 1, 0, 3, 2, 1; ventral 0, 1, 3, 3, 2; claws three. Dorsal spines of eleventh to thirteenth legs 0, 0, 3, 2, 2. (Some of coxae armed laterally as well as dorsally).

Gonopods of male uniarticulate.

Gonopods of female with first article mesally strongly chitinized and excavated at base which is constricted, in the way usual in the family. Claw large. Spines 2 + 2.

TYPE.— *A. manegitus* (Chamberlin).

The only species of this genus as here restricted known to occur north of Mexico is the type form. The species is peculiar especially in the character of the prosternum and the nature of the modification of the penult legs in the male.

ARENOBIUS MANEGITUS (Chamberlin).

Plate **6**, fig. 3–6.

Lithobius manegitus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 43, pl. 4, fig. 4.

Arenobius manegitus Chamberlin, Can. ent., 1912, **43**, p. 178.

DIAGNOSIS.— Dorsum testaceous to chestnut; head and usually first plate conspicuously darker, dark brown to deep mahogany. Antennae short; articles twenty to twenty-three. Ocelli ten to fifteen in three or four series. Body 6.65 to 6.75 times longer than width of tenth plate. Dorsal spines of anal legs 1, 0, 3, 2, 1 (♀ ♂); claws two. Dorsal spines penult legs 1, 0, 3, 2, 2 (♀) or 1, 0, 3, 2, 1 (♂). Ventral spines of thirteenth legs 0, 1, 3, 3, 2; of twelfth 0, 0, 3, 3, 2 or 0, 0, 2, 3, 2; of eleventh 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 or 0, 0, 2, 1, 1; ventral, 0, 0, 2, 1, 1 or 0, 0, 1, 2, 1. Last two pairs of coxae armed laterally. Anal legs of male crassate; fourth and fifth articles furrowed ectally, mesally and dorsally; ridges branching dorsal furrow of fifth densely pilose (Plate **6**, fig. 5). Penult legs more strongly pilose; tibia modified (Plate **6**, fig. 6). Length 15–17 mm.

Fig. 4. Distribution of Arenobius.

Description.— Dorsum testaceous to chestnut, nearly uniform, excepting for the first plate which is of same color as or but little paler than the head. Head conspicuously darker, varying from dark brown to deep mahogany, sometimes paler along the caudal border. Antennae of same color as head, becoming paler and more or less rufous distad. Venter from testaceous to rather dark brown, the caudal segments darker, often dull chestnut. Legs nearly of same color as adjacent portion of venter, the posterior pairs thus varying from dark brown to chestnut but always paler distally. Prosternum of almost same color as head, the prehensors somewhat paler and commonly of a more reddish tinge distad.

Body proportionately robust being only 6.66 to 6.75 times longer than width of tenth plate. Strongly narrowed cephalad from eighth segment to the first. Eighth and tenth plates equal in width and the first narrower than the third and equal in width to the head. Widths of head and of first, third, eighth, and tenth plates to each other as 55: 53: 55: 66: 66.

Marginal lateral breaks of head weak and but partially extending through margining. Sides of head caudad of breaks moderately convex and converging considerably to the rounded caudal corners; caudal margin a little incurved mesally. Head very nearly exactly equal in length and breadth; widest at level of breaks. Smooth or obscurely uneven, finely punctate, shining. Hairs sparse, moderately long. The most conspicuous mark is a sharply impressed median longitudinal sulcus running from anterior margin caudad to end abruptly a little in front of suture where it meets a weaker transverse furrow extending part way to each lateral margin.

Antennae short, reaching fifth to seventh segment. Composed normally of twenty articles of moderate length which decrease regularly and very gradually in size from the second distad to the penult. Articles sometimes as many as twenty-three.

Ocelli ten to fifteen in number, arranged in three or more frequently four series: *e. g.*, 1 + 3, 4, 3; 1 + 4, 3, 2; 1 + 4, 4, 3; 1 + 4, 3, 2, 1; 1 + 4, 4, 4, 1; 1 + 4, 4, 4, 2; 1 + 3, 3, 5, 3; 1 + 4, 4, 2, 2. Single ocellus large, somewhat cuneate with dorsal margin convex and apex ventrad, often indistinctly limited. Most caudal ocellus of the top series larger than the others sometimes more dorsal in position and often elongate as may also be some of the others. The first ocellus of second row also large. All ocelli deeply pigmented. Organ of Tömösvary cephalad of anterior end of second row, smaller in outline than the small ocelli.

Prosternum 1.7+ times wider than long. Teeth 2 + 2, very small, rounded, attached a little caudad of edge of prosternum on dorsal side. Spine a little mesad of each ectal angle and attached a little caudad of edge on ventral side; very stout, acutely conical, greatly exceeding in length and breadth the teeth. Anterior margin on each side straight, the two sides meeting in a very obtuse reentrant angle. Chitinous lines very distinct anteriorly but obscure below. (Plate 6, fig. 3).

Surface of first dorsal plate similar to that of head; smooth or but obscurely uneven and shining. Major plates depressed within lateral and caudal marginal rims, the depression on caudal plates more conspicuous and more furrow-like. Plates smooth and polished, no distinct furrows usually present.

On the ventral plates the most distinct mark is a median longitudinal sulcus which is longest and most distinct in the median and caudal regions, on the more caudal plates ending abruptly a little in front of the caudal margin. Lateral longitudinal furrows obscure, more often evident in anterior region of body, the plates mostly not distinctly depressed within the lateral borders. Obscurely roughened.

Coxal pores small, circular: mostly 5, 5, 5, 5, also 5, 4, 4, 4 and 5, 5, 5, 4. In one specimen 5, 5, 4, 3 on right side while 4, 5, 5, 5 on the left. Another with 5, 5, 5, 4 on left side and 5, 5, 5, 3 on right.

Spines of first legs mostly, $^{0,\,0,\,2,\,1,\,1}_{0,\,0,\,2,\,2,\,1}$, but also, $^{0,\,0,\,2,\,1,\,1}_{0,\,0,\,1,\,2,\,1}$ and, $^{0,\,0,\,1,\,1,\,1}_{0,\,0,\,1,\,2,\,1}$; of the second, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,2,\,2,\,1}$ (observed in ♂) or, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,2,\,2,\,2}$; of the third, the same or, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,2,\,3,\,2}$; of the fourth and fifth, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,2,\,2,\,2}$ or, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the sixth to eighth, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$ $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,2,\,2}$, or, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the ninth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,2,\,2}$ or ventral spines 0, 0, 2, 3, 2; of tenth and eleventh, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the twelfth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,3,\,3,\,2}$ (in ♀ and ♂) or, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$ (♂ chiefly); of the thirteenth, $^{0,\,0,\,3,\,2,\,2}_{0,\,1,\,3,\,3,\,2}$; of the penult, $^{1,\,0,\,3,\,2,\,2}_{0,\,1,\,3,\,3,\,2}$ (♀) or, $^{1,\,0,\,3,\,2,\,1}_{0,\,1,\,3,\,3,\,2}$, claws three; of the anal, $^{1,\,0,\,3,\,2,\,1}_{0,\,1,\,3,\,3,\,1}$ normally, but occasionally the dorsal spines vary to 1, 0, 3, 2, 0 or even 1, 0, 3, 1, 0, claws two, the accessory distinct. Last two pairs of coxae laterally armed.

In the males the anal legs are conspicuously thickened; the fourth and fifth joints being most strongly crassate, these distinctly furrowed longitudinally along dorsal, mesal, and ectal surfaces; the dorsal furrow of fifth joint especially deep and conspicuous, not entirely reaching distal end, distinct ridges bounding the furrow, these densely pilose, the hairs being longest where the ridges unite at distal end and there often forming a conspicuous bunch (Plate 6, fig. 5). The

fourth joint or prefemur typically with two longitudinal dorsal furrows, one toward mesal surface and one toward the ectal, the dorsal surface swollen and elevated between them. Penult legs of male more strongly swollen than the anal, the femur and tibia being especially strongly crassate, the tarsal joints abruptly more slender. A longitudinal furrow on ectal side of femur and tibia. Mesal surface of these articles also longitudinally furrowed, the furrow of the tibia conspicuously deepened at its distal end were it embraces a peculiar process bearing a brush of long hairs which projects mesad (Plate 6, fig. 6). Two dorsal longitudinal furrows on the femur, one toward mesal and one toward ectal surface with dorsal surface swollen and elevated between them, the prefemur similarly but less conspicuously modified.

Gonopods of male short but very broad with distal edge long and straight and well chitinized.

Claw of female gonopods long and very strongly curved, gradually narrowed to an acute point. Basal spines 2 + 2, subequal or the outer a little longer; robust, cylindric proximally, the distal portion subconic in ventral outline, the apex frequently notched (Plate 6, fig. 4).

Length 15–17 mm. A male 15.5 mm. long has antennae 7 mm. long and anal leg nearly 5.8 mm. long with tenth plate 2.35 mm. wide.

Praematurus.— Dorsum testaceous or light brown, with sometimes a paler, yellow, median longitudinal line and also a less distinct line on each side. Head and first dorsal plate darker brown. Antennae like head but pale and somewhat rufous distad. Venter paler, more yellow, darker caudad. Legs similar ventrally, darker dorsally; the posterior pairs darker, light distally as in adults.

Antennae as in *maturus*.

Ocelli 1 + 3, 4, 3. Single ocellus and first one of top row may be paler.

Prosternum as in adult excepting that hairs are fewer.

Coxal pores 4, 4, 4, 4.

Spines of first legs, $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,1,\,2,\,1}$; of the sixth, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,2,\,2}$; of seventh the same or, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,2,\,2}$; others as in *maturus* (the lesser spining in each case, but ventral spines of twelfth 0, 0, 3, 3, 2).

Claw of female gonopods shorter and paler than in adult. Bristles of articles fewer. Basal spines 2 + 2 but the inner one of each pair only about half the length of the outer one and much more slender, acute.

A female 13.5 mm. long has antennae 5 mm. long; anal leg near 4.5 mm. long; and eighth plate 1.75 mm. wide. (Unaka Springs, Tenn.).

Immaturus (Late).— Color nearly as in *praematurus*. Dorsum light brown or testaceous, the head darker brown or light chestnut. Antennae darkest over middle portion of length, palest distad. Venter and legs testaceous or yellowish. Posterior legs not much darkened, often pale throughout.

Articles of antennae twenty to twenty-three; those distad of the first four or five sometimes very short but with longer ones intermingled at intervals; in other cases of moderate length, decreasing gradually distad.

Ocelli 1 + 4, 2, 1, the anterior ocellus of top row, as usual, not directly in line. Also 1 + 4, 3, 3 with first and last of ventral row very small; and 1 + 3, 3, 2.

Prosternum as in older stages or very nearly so.

Coxal pores 3, 3, 3, 3 or 3, 3, 3, 2 (observed on one side only); most distal one of each series usually conspicuously larger than the others.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 1, 2, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 2}$; of the sixth and seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; of the eighth and ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$ (ventral once noted also as 0, 0, 1, 2, 2); of others as in adult excepting penult of male of which formula is, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$ as in the female.

In the male the anal legs are a little more enlarged than in the female. Penult, if different, rather more slender than the anal with the characteristic furrows present, but as in the female. Characteristic pilose ridges bounding furrow on dorsal surface of fifth joint of anal legs in adult not present nor is the peculiar excavation and setigerous lobe of tibia of penult legs, this joint also at this stage bearing two dorsal spines at distal end.

Claw of female gonopods very short and subtriangular, moderately acute distad, pale yellowish throughout. Basal spines 1 + 1, small and acute, pale. Bristles few.

A female 11 mm. long has antennae 4.25 mm. long and anal leg 4 mm. long with tenth and eighth plates 1.6 mm. wide. (Unaka Springs, Tenn.).

Immaturus (Early).— Pale testaceous. Head brown with a paler band along the suture. Antennae brown, pale distad. Prosternum light brown, prehensors testaceous. Venter dilute yellow of a violaceous tinge, darker caudad. Legs all pale with the tarsi brighter; the caudal pairs not dark, scarcely differing from the others.

Antennae very short, already consisting of twenty articles of which those beyond the third are short and decrease to the ultimate which is long.

Ocelli 1 + 3, 2, 1. The first of top row about the same size as the single ocellus which is vertically elliptic or oval as in older stages.

Prosternum nearly same as in preceding stages.

Coxal pores 3, 2, 2, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the second, $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the third, $\frac{0,0,1,2,1}{0,0,1,2,1}$ or dorsal spines 0, 0, 2, 2, 1; of the fourth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the fifth to seventh either same as fourth or ventral spines 0, 0, 1, 2, 2; of the eighth to eleventh, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,0,2,2,2}$; of the thirteenth, $\frac{0,0,3,2,2}{0,1,2,2,1}$; of the penult, $\frac{1,0,3,2,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,3,2,1}{0,1,3,2,0}$ to $\frac{1,0,3,1,0}{0,1,3,2,0}$.

Anal and penult legs of male already distinctly swollen but more or less uniformly so and the anal clearly more so than the penult. The lateral furrows present but none of the characteristic developments of the adult indicated.

Length (♂) 9.5 mm.; anal legs 3.5 mm.; antennae, also 3.5 mm.; width of eighth plate near 1.3 mm. (Unaka Springs, Tenn.).

Agenitalis I.— Pale testaceous, of violaceous tinge in life. Head more brownish, paler along the suture. Antennae yellow distad. Legs all pale, the caudal pairs mostly lighter than the others and but little darker proximad.

The twenty articles of antennae already present. In the portion distad of a few longer proximal articles, very short ones occur at intervals among longer ones. Ultimate article long.

Ocelli 1 + 3, 3, the first ocellus of each of the two series large and equal to the single ocellus or nearly so.

Prosternum as in older stages, but spine relatively even stouter, it and teeth pale.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates already produced.

Coxal pores 2, 1, 1, 1.

Anal glands still strongly developed with no trace of degeneration.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,0,1}$; of the second, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the third, $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the fourth and fifth, $\frac{0,0,1,2,1}{0,0,1,2,1}$; or dorsal spines of the latter may be 0, 0, 1, 2, 2; of the sixth to ninth, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the tenth and eleventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the thirteenth and penult, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the anal, $\frac{0,0,0,0,0}{0,0,1,1,0}$. Trochanters as yet all glabrous and unspined.

Anal and penult legs in the male already much more crassate as well as longer than the preceding pairs but otherwise not showing adult peculiarities.

Length close to 7 mm.; antennae 3 mm.; anal leg (exclusive of coxa) near 2 mm.; width of eighth plate .9+ mm. (Unaka Springs, Tenn.).

Pullus IV (*Larva quarta*).— Pale, suffused with violaceous throughout; the dorsum cephalad testaceous, caudad pale yellow. Head light brown with a rather broad paler band along the suture. Antennae paler, yellowish distad. Venter yellow caudad, darker cephalad. Of the developed legs the posterior pairs are lightest.

Antennae composed of twenty articles. Very short articles occurring at intervals in groups between longer ones, the first three or four longer than the others as in later stages. Hairs more sparse.

Ocelli 1 + 2, 1. Single ocellus largest, the first of the upper row much larger than other seriate ocelli.

Prosternum as in older stages excepting for fewer bristles; teeth and spines paler.

A single pore on each coxa of twelfth pair of legs.

Anal glands conspicuous.

The last three pairs of legs appearing as slender buds, closely appressed, in which the portion distad of the coxa is unsegmented.

Spines of first legs either none at all or, $\frac{0,0,0,0,1}{0,0,0,0,0}$; of the second, $\frac{0,0,0,0,1}{0,0,0,0,1}$; of the third, $\frac{0,0,0,1,1}{0,0,0,1,1}$ (right) or dorsal 0, 0, 0, 0, 1 (left); of the fourth to seventh, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the eighth, $\frac{0,0,0,1,2}{0,0,0,1,1}$; of the ninth, $\frac{0,0,1,1,2}{0,0,0,1,1}$; of the tenth, $\frac{0,0,1,1,1}{0,0,1,1,1}$ (right) or dorsal 0, 0, 1, 1, 2 (left); of the eleventh and twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$.

Length near 5.8 mm. (Unaka Springs, Tenn.).

Type.— M. C. Z., No. 596, North Carolina: Hot Springs.

Paratypes.— North Carolina: Hot Springs, M. C. Z., No. 588; Catawba, M. C. Z., No. 597; Saluda, M. Z. C., No. 594; Linville Falls, M. C. Z., No. 591. Tennessee: Johnson City, M. C. Z., No. 590; Unaka Springs, M. C. Z., No. 593; Altapass, M. C. Z., No. 595.

PLATE 1.

PLATE 1.

Gosibius paucidens (Wood).

Fig. 1. Anterior portion of prosternum.
Fig. 2. Left gonopod of ♀, ventral view. (Claremont, Cal.).
Fig. 3. Third and fourth and part of fifth article of anal leg of ♂, dorsal view. (Laurel Canyon, Cal.).
Fig. 4. Fifth and part of third and fourth articles of right penult leg of ♂, mesal view. (Laurel Canyon, Cal.).

Gosibius montereus Chamberlin.

(Type, Pacific Grove, Cal.).

Fig. 5. Proximal portion of gonopod of ♀, ventral view.

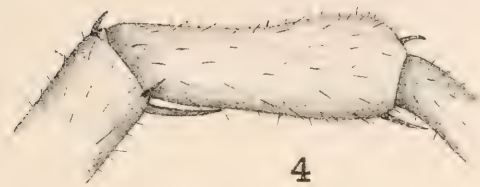

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PLATE 2.

PLATE 2.

Gosibius brevicornis Chamberlin. (Type, Friant, Cal.).

Fig. 1. Anterior portion of prosternum.
Fig. 2. Fourth and fifth articles of right anal leg of ♂, dorsal view.
Fig. 3. Mesal view of fifth article of left anal leg of ♂.
Fig. 4. Mesal view of fifth article of left penult leg of ♂.

Gosibius arizonensis Chamberlin. (Type, Fort Williams, Arizona).

Fig. 5. Proximal portion of left gonopod of ♀.

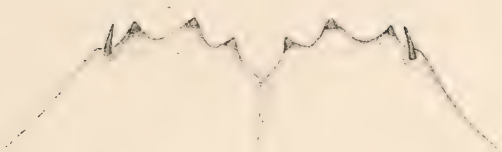

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PLATE 3.

PLATE 3.

Gosibius arizonensis Chamberlin. (Ft. Williams, Arizona).

Fig. 1. Anterior portion of prosternum.

Gosibius intermedius Chamberlin. (Santa Barbara, Cal.).

Fig. 2. Lateral portions of sixth, seventh, and part of eighth dorsal plates in outline.
Fig. 3. Fourteenth dorsal plate in outline.

Pseudolithobius megaloporus Stuxberg. (Oroville, Cal.).

Fig. 4. Left gonopod of ♀, ventral view.
Fig. 5. Fifth article and part of two adjoining ones of penult leg of ♂.

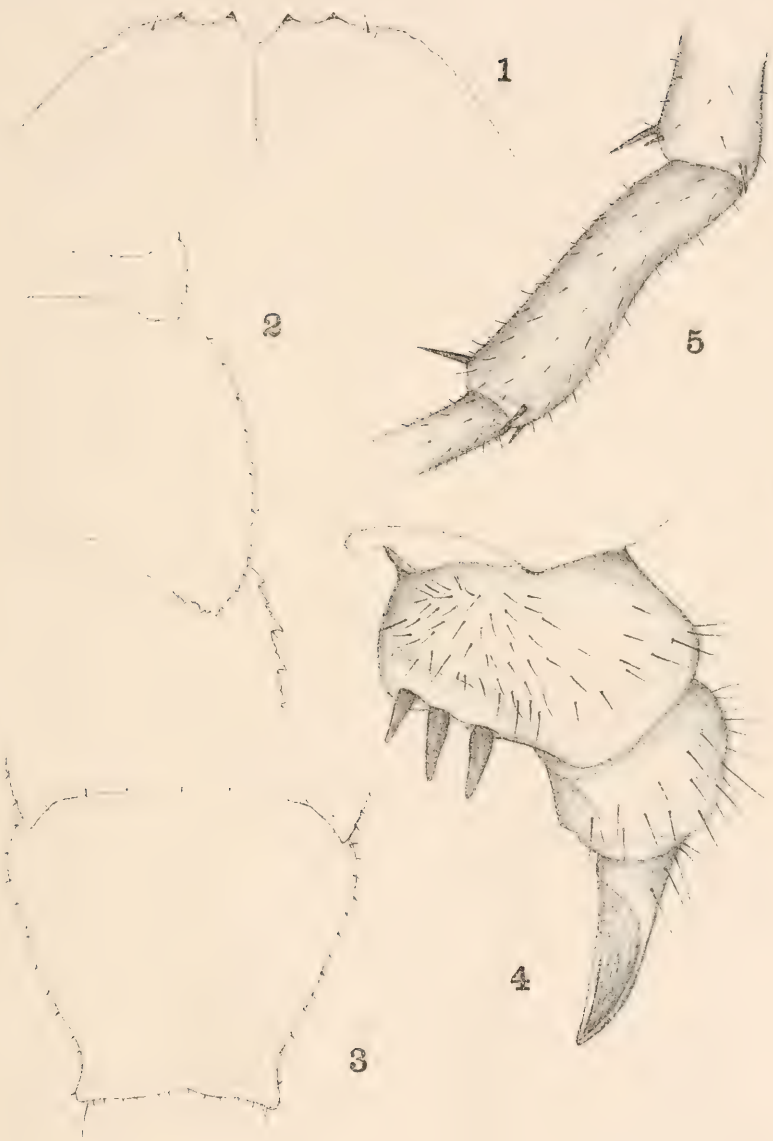
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PLATE 4.

PLATE 4.

Pseudolithobius megaloporus Stuxberg.

Fig. 1. Portion of right anal leg of ♂, dorsal view.
Fig. 2. Anterior portion of prosternum.

Guambius coloradanus Chamberlin. (Durango, Col.).

Fig. 3. Left gonopod of ♀, ventral view.
Fig. 4. Dorsal view of fifth and part of adjoining articles of anal leg of ♂.
Fig. 5. Fifth and part of adjoining articles of penult leg of ♂, lateral view.

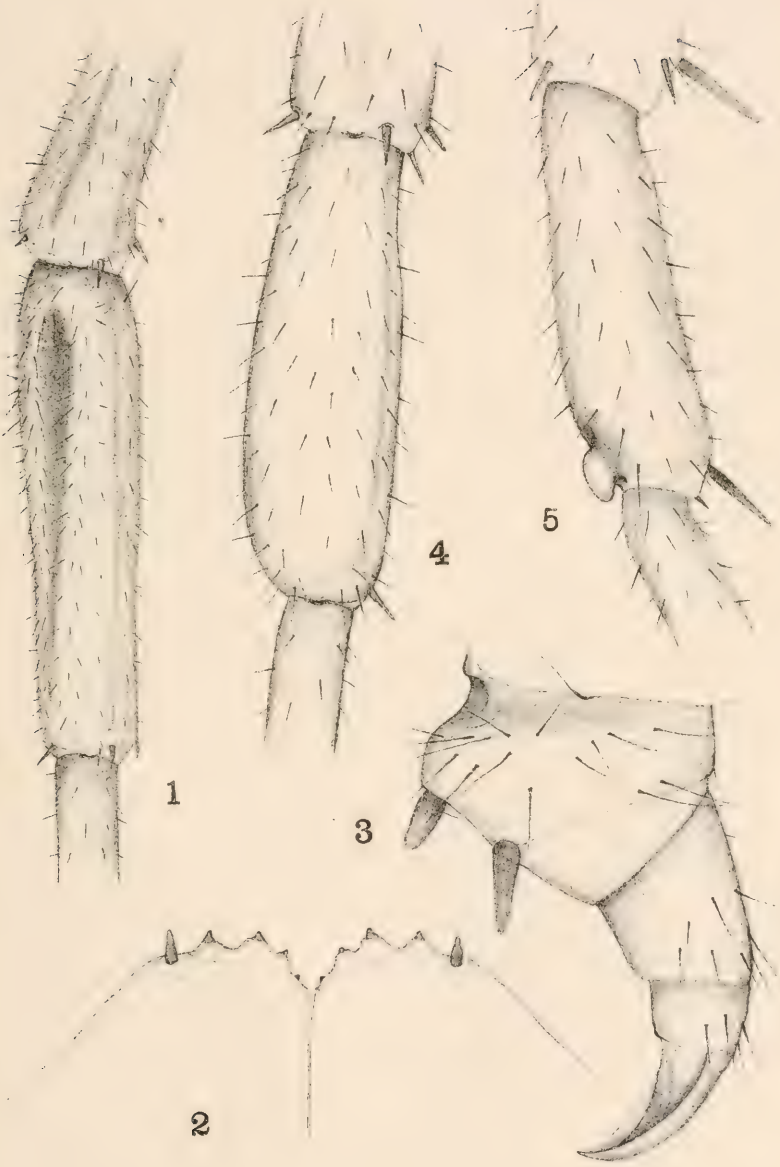
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PLATE 5.

PLATE 5.

Guambius coloradanus Chamberlin.

Fig. 1. Anterior portion of prosternum.

Guambius oedipes (Bollman). (Type, Little Rock, Ark.).

Fig. 2. Second to fourth and part of fifth articles of right anal leg of ♂, mesal view.

Fig. 3. Fourth and fifth and part of adjacent joints of left penult leg of ♂, mesal view.

Guambius mississippiensis Chamberlin. (Type, Byram, Miss.).

Fig. 4. Left gonopod of ♀, ventral view.

Fig. 5. Fifth and part of adjoining articles of left penult leg of ♂, mesal view.

Guambius curtior Chamberlin. (Type, Gulfport, Miss.).

Fig. 6. Fifth and part of adjoining articles of left penult leg of ♂, mesal view.

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PLATE 6.

PLATE 6.

Guambius curtior Chamberlin.

Fig. 1. Outline of adjoining portions of fifth and sixth articles of penult leg of ♂, dorsal view.
Fig. 2. Third and fourth and part of fifth joints of anal leg, dorsal view.

Arenobius manegitus. (Chamberlin) (North Carolina).

Fig. 3. Anterior portion of prosternum.
Fig. 4. Right gonopod of ♀, ventral view.
Fig. 5. Fifth article and part of adjoining ones of anal leg of ♂, dorsal view.
Fig. 6. Ventral view of fifth and part of adjoining articles of right penult leg.

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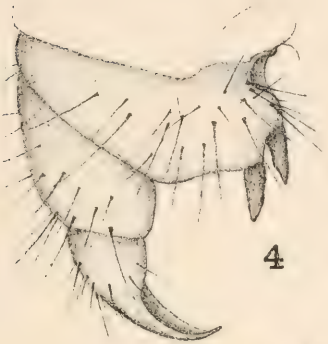

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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
Vol. LVII, No. 6.

FURTHER STUDIES ON NORTH AMERICAN LITHOBIIDAE.

By Ralph V. Chamberlin.

With Twelve Plates.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
June, 1922.

No. 6.— *Further Studies on North American Lithobiidae.*

By Ralph V. Chamberlin.

The present paper, written in 1914, consists of revisions of new or recently described genera of Lithobiidae as represented in America, north of Mexico.

All of the material upon which this paper is based was collected by the author, unless specifically stated to the contrary.

The key will aid in the separation of the genera.

Key to the Genera.

a. No ocelli present..... *Typhlobius*, gen. nov.

aa. Ocelli present.

b. Prosternal teeth 5+5 or more.

Posterior angles of none of the dorsal plates produced; articles of antennae more than 25..... *Sozibius* Chamberlin.

bb. Prosternal teeth normally 2+2, or occasionally up to 4+4.

c. Fourth joint in anal leg of male with a lobe at proximal end bearing a dense brush of very long hairs.

Posterior angles of none of dorsal plates produced; articles of antennae about 24..... *Pampibius*, gen. nov.

cc. Fourth joint of anal legs of male not thus modified.

d. Articles of antennae 26 or more. (Posterior angles of ninth, eleventh, and thirteenth dorsal plates, or of seventh, or of sixth and seventh in addition, produced).

e. Line of apices of prosternal teeth more or less procurved, the inner tooth of each pair being the larger; basal spines of gonopods of female slender.

Paitobius Chamberlin.

ee. Line of apices of prosternal teeth recurved; basal spines of gonopods of female short and very broad.

Taiyubius Chamberlin.

dd. Articles of antennae normally 20, rarely as many as 24 (but when so none of dorsal plates with posterior angles produced).

e. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced; neither anal nor penult legs of male with any special process or lobe; anal legs with two or three claws... *Sonibius* Chamberlin.

ee. Posterior angles of none of dorsal plates produced or, rarely, those of eleventh and thirteenth, or of ninth, eleventh, and thirteenth weakly produced, but, when so, claw of anal leg single; with few exceptions, either anal or penult legs in male with special lobes or ridges,

f. Fifth joint of anal leg of male always bearing on dorsal surface at distal end a conspicuous crest. *Nadabius* Chamberlin.

ff. Fifth joint of anal legs of male with no such crest.

g. Penult legs of male bearing a conspicuous lobe at distal end of fifth article, but anal legs without special process..... *Simobius*, gen. nov.

gg. Penult legs of male bearing no such lobe, or if so the anal legs also strongly modified; the third and fourth joints of the latter nearly always longitudinally ridged and produced into lobes, rarely not modified..... *Pokabius* Chamberlin.

Sozibius Chamberlin.

Ann. Ent. soc. Amer., 1912, **5**, p. 152.

Head with lateral marginal interruptions distinct.

Antennae moderate in length or short; composed of from twenty-five to thirty-five articles.

Eye composed of seriate ocelli; a single ocellus usually moderately enlarged, but sometimes subequal to caudal ocellus of upper series.

Prosternal teeth 5+5 to 7+7; spines slender, distally bristle-like.

Posterior corners of ninth, eleventh, and thirteenth dorsal plates straight or somewhat excised, or those of thirteenth, or of eleventh and thirteenth, weakly produced.

Coxal pores circular uniseriate.

Gonopods of male uniarticulate.

Claw of genital forceps of female large; either entire or with one or two relatively small lateral teeth situated well proximad. Spines 2+2; moderately long and slender, mostly more or less acuminate from base. First article of forceps not excavated proximally.

Tarsi of all legs divided.

In the anal legs of the male the fourth joint is more or less thickened, especially distally and is dorsally longitudinally furrowed and typically concave or saddle-shaped; at distal end more or less elevated dorsad (Plate **1**, fig. 1, 6).

Last one or two pairs of coxae laterally armed. Third joint of all legs caudad of first to sixth pairs with three dorsal spines, the others with two. Fifth joint of all legs between third and eleventh pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 1, 3, 3, 2; the claw single. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; claw single. Dorsal spines of twelfth legs, 1, 0, 3, 1, 1 or 0, 0, 3, 1, 1; ventral, 0, 0, 3, 3, 2. Dorsal spines of first legs mostly 2, 1, 1, occasionally 1, 1, 1 or 2, 2, 1; ventral 2, 2, 1 to 2, 3, 2.

Length 8–14 mm.

TYPE.— *S. tuobukus* (Chamberlin).

This interesting genus, at present known from three species, has a rather restricted distribution (Fig. 1). It is very common in North Carolina, Tennessee, and Virginia, especially, it would seem, in the mountainous sections. This region appears to be the center of distribution. It is known from as far north as Philadelphia and as far west as Arkansas.

Key to Species of Sozibius.

a. Dorsal spines of second legs 0, 0, 3, 2, 1; ventral spines of first legs in adults nearly always 0, 0, 2, 3, 2; claw of ♀ gonopods strictly entire. ..... *S. providens* (Bollman).

aa. Third joint of first three to six pairs of legs with but 2 dorsal spines, the formula of the second pair being 0, 0, 2, 2, 1; ventral spines of first legs 0, 0, 2, 2, 1; claw of ♀ gonopods either bipartite or tripartite.

b. Last pair of coxae alone laterally armed; first five or six pairs of legs with third joint bearing but 2 dorsal spines. *S. pennsylvanicus*, sp. nov.

bb. Last two pairs of coxae laterally armed; only the first three or four pairs of legs with but 2 dorsal spines on third joint. *S. tuobukus* (Chamberlin).

SOZIBIUS TUOBUKUS (Chamberlin).

Plate **1**, fig. 6; Plate **2**, fig. 1, 2.

Lithobius tuobukus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 36.
Sozibius tuobukus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 152.

DESCRIPTION.— Dorsum light brown or testaceous, often of a more or less orange cast, the posterior plates commonly in some degree

FIG. 1.—Distribution of Sozibius.

darker. Head either the same in color as the dorsum or, more typically, a darker brown with the frontal region paler, somewhat orange or ferruginous; the first dorsal plate commonly agreeing in color with the posterior portion of head. Antennae light yellowish brown proximally, yellow distad. Venter pale brown or brownish yellow with the caudal plates darker. Prosternum and prehensors somewhat orange-brown to very dilute chestnut. Legs pale brownish yellow, the caudal pairs bright yellow, especially distad.

Body moderately narrowed cephalad to the first dorsal plate, the widths of head and of the first, third, eighth, tenth, and twelfth plates being to each other as 64 : 58 : 60 : 69 : 72 : 67.

Head from equal in length and breadth to wider than long in ratio 20 : 19 or less, the head in the ♂ appearing to be wider on the average than in the ♀. Widest just caudad of eyes, rather conspicuously narrowed cephalad; caudal margin mesally slightly incurved. Marginal interruptions very slight, sometimes essentially obsolete.

Antennae commonly reaching to the seventh segment but sometimes considerably shorter and not surpassing the fifth. Articles twenty-five to thirty of intermediate length; the ultimate usually distinctly shorter than the two preceding taken together, distally pointed.

Ocelli from nine to eighteen, usually in four series, sometimes in three: *e.g.*, 1 + 5, 3, 2; 1 + 4, 5, 4; 1 + 3, 3, 2; 1 + 4, 5, 4, 2; 1 + 5, 4, 4, 3; 1 + 5, 4, 3, 2; 1 + 2, 5, 5, 3; 1 + 6, 5, 4, 1. Single ocellus usually only a little, or sometimes not at all, larger than the most caudal ocellus of the dorsal series, the corresponding one of the second series also often large; mostly vertically subelliptic, but sometimes circular and sometimes angular. The seriate ocelli vary, often irregularly, in an unusual degree in size, form, and arrangement, with the series frequently very irregular.

Prosternum 1.6–1.7, mostly near $1\frac{2}{3}$, times wider than long. Distance between the chitinous spots 1.87 + 2 times the width at level of bottom of median incision; 2.5 to 2.7 times the dental line. Teeth 5 + 5 or 6 + 6, rather small, uniform, the line of apices forming a distinctly reentrant angle. Spine slenderly acuminate, bristle-like, and straight or nearly so. Incision distinctly u-shaped or with the bottom sometimes somewhat angular.

First dorsal plate with the sides weakly convex, moderately converging caudad to the widely rounded caudal corners; caudal margin mesally incurved; plate 1.6+ times wider than long. Caudal margin of the ninth plate straight all the way across. Eleventh plate with

the posterior corners showing tendency toward weak production, while the corners of the thirteenth plate are more distinctly, but still only slightly, produced.

Coxal pores circular: 3, 4, 4, 3; 3, 4, 5, 4; 4, 5, 5, 4; 4, 6, 6, 4; 5, 6, 6, 5.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,2,2,1}$ or $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the second, $\frac{0,0,2,1,1}{0,0,2,2,1}$ and $\frac{0,0,2,1,1}{0,0,2,3,1}$ to $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the third, $\frac{0,0,2,2,1}{0,0,2,3,2}$ or, occasionally, $\frac{0,0,2,2,1}{0,0,2,3,1}$; of the fourth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the fourth to the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1\,(0),0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1\,(0),0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, or sometimes, on one side, $\frac{1,0,3,1,1}{0,1,3,3,1}$, the claw single; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,2}$ or occasionally, $\frac{1,0,3,1,0}{0,1,3,3,1}$, or the spine of trochanter rarely missing. Last two pairs of coxae normally armed, rarely only the anal.

Anal legs of the male with the third article thickened into a rounded longitudinal ridge which is subdensely clothed with long bristles. Fourth article elevated into a rounded prominence at proximal end, this being clothed like the ridge of the preceding joint; caudad of this elevation the joint is longitudinally excavated or furrowed, with a ridge-like elevation on each side, the mesodorsal one of which increases in height, and in the number of hairs borne, proximad, while the ectodorsal one increases in similar manner distad and terminates in an elevation at distal end of joint which is often conspicuous and which bears the dorsal spine, the latter frequently projecting directly caudad (Plate **1**, fig. 6). Penult legs more slender but they may be similarly though more weakly modified.

Gonopods of male small but distinctly exposed; oblique.

Claw of female gonopods large, long, well curved, and very acutely pointed; bipartite, the main lobe bearing the second near the middle of its length on the outer or ventral edge as a very small denticle, or tridentate, a denticle appearing at nearly the same level on the outer edge (Plate **2**, fig. 1). Basal spines 2 + 2; the outer one of each pair only a little or not at all longer than the inner; in ventral view moderately narrowing from base to near middle and then of uniform width to the beginning of the acuminate division which is long and acute; outer edge often denticulate (Plate **2**, fig. 2).

Length 9 to 13 mm.

Early pseudomaturus.—Body yellow or brownish yellow. Head and prosternum darker, orange. Legs yellow, the posterior pairs brightest.

Antennae consisting of twenty-six articles which distad of the third are very short and closely united. Ultimate article much longer than the two preceding taken together.

Ocelli 1 + 3, 2. Single ocellus and first two of the upper series subequal in size; the two ocelli of the ventral series much smaller. Single ocellus not distinctly separated or otherwise differentiated.

Prosternum of same form and structure as in *maturus*. Teeth 5 + 5, on each side decreasing mesad and the most mesal one considerably reduced.

Coxal pores very small: 2, 3, 3, 3.

Claw of female gonopods proportionately shorter than in the *maturus*, with the lateral tooth or teeth occasionally only vaguely indicated. Spines 2 + 2, more attenuated distad than in *maturus* and the inner spine proportionately shorter.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,2,2,1}$; of the second and third, $\frac{0,0,2,2,1}{0,0,2,2,1}$; of the fourth, $\frac{0,0,2,2,1}{0,0,2,2,1}$, or $\frac{0,0,2,2,1}{0,0,2,2,2}$; of the fifth, $\frac{0,0,2,2,1}{0,0,2,2,2}$; of the sixth to eighth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the remaining pairs as in the *maturus*. Last two pairs of coxae similarly laterally armed.

Length near 7.5 mm.

Specimens described, collected at Johnson City, Tenn., in August, 1910, are nearly between usual *praematurus* and *pseudomaturus* stages.

Immaturus.— Coloration as in preceding form.

Articles of antennae twenty-four. (Regenerating antenna on one side has but fifteen).

Ocelli 1 + 2, 2; 1 + 2, 3. First ocellus of upper series larger than the single ocellus. All contiguous.

Prosternum with teeth 5 + 5, the most mesal on each side being very small. Incision, spines, and general structure as in the older stages.

Coxal pores very small: 2, 3, 3, 2; 2, 3, 3, 3.

In the gonopods of the female the three articles are present. Third article with claw indicated as a small, pale, acute point. Second article with one bristle, the first with three. Spines 1 + 1, minute, acute, pale.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the second, $\frac{0,0,0,1,1}{0,0,1,1,1}$ or $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the third, $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the fourth to seventh, $\frac{0,0,1,2,2}{0,0,1,2,1}$; of the eighth to tenth, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,2,1,1}$ (right side) or $\frac{1,0,2,1,1}{0,1,2,2,2}$ (left side); penult and anal legs missing from specimen described. Last three pairs of coxae dorsally armed, but no lateral spines detected on any.

Length near 6.7 mm. (Johnson City, Tenn., August, 1910).

Agenitalis I.— Pale, very dilute yellowish, throughout.

Antennae very short; articles twenty.

Ocelli 1 + 2, 1, also in one case 1 + 3, 2 (South Carolina). First

ocellus of upper series largest, the single one being next in size, while the other two are much smaller.

Prosternal teeth 4 + 4.

Coxal pores very small: 1, 1, 1, 1.

Anal glands fully developed and very distinct.

Spines of the first legs, $\frac{0,0,0,0,1}{0,0,0,0,1}$; of the second, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the third, $\frac{0,0,0,0,1}{0,0,0,1,1}$ or $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the fourth to seventh, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the ninth, $\frac{0,0,0,1,1}{0,0,1,1,1}$, the two dorsal spines being on the anterior side; of the tenth, $\frac{0,0,1,1,1}{0,0,1,1,1}$, the dorsal spine of fourth joint being caudal and that of fifth joint anterior in position; of the eleventh to thirteenth, $\frac{0,0,0,0,0}{0,0,1,1,1}$; others wanting. None of the coxae armed dorsally or laterally.

Length near 5 mm. (Johnson City, Tenn., August, 1910).

Type Locality.— North Carolina: Hot Springs.

Also taken in North Carolina: Linnville Falls, Brown's Summit. South Carolina: Greenville. Tennessee: Johnson City, Unaka Springs. Virginia: Chatham, Lynchburg, Natural Bridge. West Virginia: White Sulphur. Kentucky: Lexington.

The specimens recorded by Bollman from Washington, D. C., as *L. providens* probably belong to the present species.

Sozibius pennsylvanicus, sp. nov.

Plate 1, fig. 1–5.

Description.— From light brown to chestnut, the normal color in specimens in full color, the species being darker than the other two known. Head and, usually, the first dorsal plate darker, the head having a dusky or black area or spot caudad of the suture in front of which it is light ferruginous or orange. Antennae brown proximally, yellowish distally. Venter but little paler than the dorsum, darkest caudally as usual. Prosternum and prehensors typically dark brown to dilute chestnut, the prehensors paler distad. Legs brownish yellow or brown, the posterior pairs more brightly colored, commonly bright yellow, especially distally and ventrally.

Body strongly narrowed cephalad, the widths of head and of first, eighth, tenth, and twelfth plates being to each other as 56 : 52 : 56 : 64 : 66 : 60.

Head equal in length and breadth strongly narrowed cephalad. Marginal breaks very small as in related species.

Antennae short, reaching fifth to seventh segments. Articles nearly always twenty-seven or twenty-eight, mostly the latter; short and very short and usually closely compacted. Ultimate article of moderate length.

Ocelli nine to fifteen, usually in three but also often in four series: *e.g.*, 1 + 5, 4, 3; 1 + 5, 6, 4; 1 + 4, 4, 3; 1 + 3, 3, 2; 1 + 4, 3, 3, 1; 1 + 5, 4, 3, 2. Single ocellus somewhat largest or equal to or smaller than first of upper series and scarcely differentiated. Ocelli varying much in relative and absolute size and in arrangement. Organs of Tömösvary in outline usually clearly larger than any ocellus (Plate **1**, fig. 2, 3).

Prosternum with median incision small, u-shaped. Teeth mostly 5 + 5, apically rounded, on each side somewhat decreasing mesad. Spine slender, only a little curved, inserted close to the ectal tooth as usual. 1.73–1.76+ times wider than long. Distance between chitinous spots 2+ times width at level of bottom of incision; 2.75 times the dental line.

First dorsal plate 1.75+ or more times wider than long; widest cephalad but only weakly narrowed caudad to the rounded corners. Posterior corners of the ninth, eleventh, and thirteenth dorsal plates with caudal side straight or slightly rounded, in some a little obliquely excised on one side, not at all produced or rarely showing a very vague tendency toward production.

Coxal pores: 2, 3, 3, 2; 3, 3, 3, 3; 3, 3, 3, 2; 2, 3, 3, 3; 3, 4, 4, 4.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,2,1}$; of the third, $\frac{0,0,2,2,1}{0,0,2,2,2}$; of the fourth to sixth, $\frac{0,0,2,2,2}{0,0,2,2,2}$ or $\frac{0,0,2,2,2}{0,0,2,3,2}$, or of sixth sometimes $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the seventh to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,2}$. Only the last pair of coxae laterally armed.

Fourth joint of the anal legs in the male moderately thickened; the dorsal surface bowed in concavely between the ends and longitudinally shallowly furrowed; elevated at distal end; hairs straight, sparse, much fewer than in *providens* and *tuobukus* (Plate **1**, fig. 1).

Claw of female gonopods large; only moderately curved; subacute; always with a distinct small lobe or tooth on the outer or ventral edge a little distad of middle of length and there may also be a smaller denticle on the dorsal edge farther distad (Plate **1**, fig. 4). Spines 2 + 2; outer one of each pair a little longer than the mesal one; in ventral view both spines appear distinctly and uniformly acuminate from base to apex with the sides appearing smooth or the ectal edge of inner spine showing denticulations, but these commonly bent dorsad and not always evident in ventral view (Plate **1**, fig. 5).

Length 8 to 10 mm., this species averaging considerably less in size than either of the other two species.

Praematurus.— (Male.) Yellow throughout. Head caudad of su-

ture darker, dusky yellow; frontal region dilute orange. Prosternum dusky yellow, prehensors distally a brighter yellow. Legs yellow.

Antennae composed of twenty articles which are short and closely united.

Ocelli 1 + 3, 3; 1 + 3, 2. Single ocellus smaller than the first one of the upper series which is much larger than the other seriate ocelli.

Prosternum with incision, spines, and general structure as in *maturus* stage. Teeth 5 + 5.

Coxal pores very small: 2, 3, 3, 2.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$ or $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$; of the third, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$ to $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the fourth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the fifth to eleventh $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$.

Anal leg of male with the fourth joint but little modified, the dorsal surface being slightly bowed and a little elevated distad.

Length 7 mm.

Pullus II (*Larva secunda*).— Body and legs essentially without pigment; the head, prosternum, and antennae with a very dilute yellowish tinge.

Ocelli 1 + 2, 1. First ocellus of upper series largest, the single one next, the other two being much smaller.

Prosternum with median incision relatively wide, semicircular. Teeth 3 + 3.

Eight pairs of developed legs are present, the slender appressed buds of two additional pairs appearing caudad of these. The sixth, seventh, and eighth pairs of legs have a division indicated in their tarsi while the tarsi of the more anterior pairs appear entire.

Spines of first to seventh pairs of legs, $\frac{0,\ 0,\ 0,\ 0,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the eighth, $\frac{0,\ 0,\ 0,\ 0,\ 0}{0,\ 0,\ 1,\ 1,\ 1}$. Ventral spine of tibia relatively long and stout, much exceeding the others in size. Ventral spine of third joint, when present, small. Dorsal spine of tibia slender and almost bristle-like. Hairs relatively long.

Length near 3.5 mm.

Type.— M. C. Z., No. 94, Pennsylvania: Upsal, October 20, 1912. Many specimens.

Sozibius providens (Bollman).

Plate **2**, fig. 3–6.

Lithobius providens Bollman, Amer. nat., 1887, **21**, p. 81. Proc. U. S. N. M., 1887, **10**, p. 258. Bull. 46, U. S. N. M., 1893, p. 19, 24, 79, 82, 85, 92, 100, 110, 133.

DESCRIPTION.— Dorsum light brown to yellowish. Head darker, light chestnut, with the frontal region paler, often ferruginous. Antennae brown or brownish yellow proximally, paler distally. Venter brown to yellow of paler cast than dorsum; the posterior plates darker as usual. Prosternum and prehensors light chestnut of nearly same shade as head. Legs like corresponding plates of venter excepting that the caudal pairs may be lighter, sometimes being bright yellow, especially ventrally and distally.

Body robust, 7 to 7.5 times longer than width of tenth plate. Body considerably narrowing cephalad to the first dorsal plate, which is decidedly narrower than the third, the widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 65 : 58 : 62 : 75 : 76 : 70.

Head precisely equal in length and breadth, or very nearly so. Widest just caudad of eyes, from these narrowing gradually and but little to the rounded caudal corners. Posterior margin mesally incurved. Lateral marginal breaks small but usually distinct.

Antennae usually reaching the sixth segment but sometimes longer and attaining the eighth. Slender distally. Articles twenty-eight to thirty-five; mostly short; rather loosely joined; ultimate long and slender, usually a little longer than the two preceding ones taken together.

Ocelli nine to fifteen in four series or, less commonly, in three: *e. g.*, 1 + 3, 3, 3; 1 + 2, 3, 2, 1; 1 + 3, 3, 3, 2; 1 + 3, 4, 4, 3; 1 + 4, 4, 4, 2; 1 + 4, 3, 3, 1, and 1 + 4, 3, 3, 2, the two last seeming to be the commonest arrangements. Single ocellus commonly largest but sometimes equal to or smaller than the first of the most dorsal series. Seriate ocelli varying considerably in relative and absolute size in different specimens and also in form, being sometimes angular or elongate rather than circular.

Prosternum with teeth acute, uniform, moderate; decreasing somewhat in size from most ectal to most mesal on each side; line of apices on each side a little convex, as a whole forming a reentrant angle; teeth in number 5 + 5 to 7 + 7. Median incision narrowly u-shaped, often narrower at mouth than at bottom. Spine straight, slenderly acuminate and bristle-like, inserted near ectal tooth. $1\frac{2}{3}$ to 1.7 times wider than long. Distance between chitinous spots 1.85–1.88 times width at level of bottom of mesal incision; 2.75–288+ times the dental line (Plate **2**, fig. 3).

First dorsal plate 1.6+ times wider than long. Considerably narrowed caudad, with the sides convex. Ninth plate with the

caudal margin straight, or one corner may be obliquely excised. Caudal corners of eleventh and thirteenth plates slightly produced, those of the thirteenth the more distinctly so.

Coxal pores: 3, 4, 4, 3; 4, 4, 4, 3; 4, 5, 4, 3; 4, 4, 5, 4; 4, 5, 5, 4; 4, 5, 5, 3; 5, 6, 6, 4; etc.

Spines of first legs usually, $\frac{0,0,2,2,1}{0,0,2,3,2}$, sometimes, $\frac{0,0,2,2,1}{0,0,2,2,1}$ in specimens toward *pseudomaturus* stage; of the second and third, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the fourth to tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,2}$. Last two pairs of coxae, laterally armed.

As in *tuobukus*, the fourth joint of the anal legs in the male is typically conspicuously thickened, more strongly so distad than proximad, and is elevated dorsad at the distal end; cephalad of this rounded dorsal elevation the joint is longitudinally depressed and furrowed; the bulge or ridge along mesodorsal surface mesad of the furrow clothed subdensely, especially toward proximal end, with very long bristles. Usually the fifth joint is slender but is somewhat clavately and usually irregularly enlarged distad and may in fact project ventrad in a conspicuous lobe at the distal end. Tibial and tarsal joints longitudinally sulcate along mesal surface. Penult legs slender, with the last three or four joints sulcate longitudinally on caudal (mesal) side.

Claw of female gonopods long, not much curved, scarcely excavated on inner side; comparatively narrow and acutely pointed; strictly entire, there being no trace of lateral teeth.

Basal spines 2 + 2; long and rather slender; acuminate from base to tip which may be very narrowly rounded; in ventral view the edges are either smooth or one or more denticles may appear on the ectal edge of inner spine, or occasionally on outer one, or the edges sometimes finely undulate; if the spines are viewed from side, however, denticles directed dorsad from the edges, which are bent or partly rolled, may be seen. Extremes of variation in form of spines are shown (Plate **2**, fig. 5, 6).

Length 11 to 14 mm. A male 14 mm. long has antennae 7+ mm. long; anal legs cir. 4.25 mm. long; and tenth plate 2 mm. wide.

Immaturus.— Light yellow. Head a little darker, of dilute orange tinge. Prosternum and prehensors like head. Venter yellow. Legs light yellow, the posterior pairs brightest.

Antennae composed of twenty-five to twenty-seven articles which are mostly short, sometimes with two shorter ones appearing together at intervals and being, apparently, the result of more recent subdivision

of a preceding single article. Ultimate article long, conically acuminate, distally rounded.

Ocelli 1 + 2, 3. The first ocellus of upper series much larger than the other seriate ocelli and as large as or, more usually, considerably larger than the single ocellus. Organ of Tömösvary relatively large as in the *maturus*.

Prosternum in general proportions and form as in the *maturus*. Median incision u-shaped, with sides more widely divergent than in adult. Teeth 4 + 4 or 5 + 5.

Coxal pores: 2, 3, 3, 2; 3, 3, 3, 3.

The three articles of gonopod of female are present, the claw on the distal one being also represented as a small, acute, chitinous point. Basal spines 1 + 1, these appearing merely as acute chitinous points.

Anal glands absent or obscurely traceable as more or less degenerated remnants.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the second, $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the third, $\frac{0,0,1,2,1}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the fourth, $\frac{0,0,1,2,2}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,1,1}$ to $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the fifth, $\frac{0,0,1,2,2}{0,0,1,1,1}$ to $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the sixth, $\frac{0,0,2,2,2}{0,0,1,1,1}$ or $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the seventh and eighth, $\frac{0,0,2,2,2}{0,0,1,1,2}$ or $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,1,2}$, $\frac{0,0,2,2,2}{0,0,1,2,2}$ or $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the tenth, $\frac{0,0,2,2,2}{0,0,1,1,2}$ to $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the eleventh, $\frac{0,0,2,1,2}{0,0,1,2,2}$ or $\frac{0,0,2,1,2}{0,0,2,2,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,3,2,2}$ or $\frac{0,0,2,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{0,0,2,1,1}{0,1,2,2,1}$ to $\frac{0,0,2,1,1}{0,1,3,3,2}$; penult, $\frac{1,0,1,1,0}{0,1,1,2,1}$ or $\frac{1,0,1,1,0}{0,1,1,2,0}$, the coxal spine minute. Either none of the coxae laterally armed or the last pair with a very small lateral spine.

Length 6.5–7.5 mm. (Russellville, Tenn., August, 1910).

Agenitalis II.— Light yellow throughout. The head, prosternum, and prehensors a little darker, of an orange cast.

Antennae in specimens studied with twenty-two or twenty-three articles which are short or very short, the shortest ones occurring in pairs at intervals as usual. Ultimate article relatively long, clearly exceeding the two preceding together.

Ocelli 1 + 2, 3; 1 + 2, 2; 1 + 2, 1. The most caudal eye of dorsal series much larger than any other, with the single ocellus next in size. All ocelli pale; well separated.

Incision of prosternum with sides divergent as in preceding stage. Teeth 4 + 4.

Coxal pores: 1, 2, 2, 2; 2, 2, 2, 2; very small.

Gonopods of female apparent as short, biarticulate buds.

Anal glands absent or degenerate.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,1,1}$ or $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the second, $\frac{0,0,0,0,1}{0,0,1,1,1}$; of the third, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the fourth to sixth, $\frac{0,0,0,1,1}{0,0,1,1,1}$ or $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the seventh, $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the eighth and ninth, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the tenth, $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the

eleventh and twelfth, $\frac{0,0,1,1,0}{0,0,1,1,1}$; of the thirteenth, $\frac{0,0,0,0,0}{0,0,1,1,1}$ or $\frac{0,0,1,0,0}{0,0,1,1,1}$; of the penult, $\frac{0,0,1,0,0}{0,0,1,1,1}$; of the anal, $\frac{0,0,1,0,0}{0,0,1,1,1}$, the trochanter bearing a bristle distally. None of the coxae armed.

Length 5–6 mm. (Russellville, Tenn., August, 1910).

Type Locality.— Indiana: Bloomington.

Also taken in Indiana at La Fayette, Richmond, Brookville, Salem, New Providence, Wyandotte. Tennessee: Russellville, Knoxville, Beaver Creek, Mossy Creek. Arkansas: Little Rock.

Typhlobius, gen. nov.

Head with lateral marginal interruptions only vaguely indicated by a slight obliquity at the point where usually developed.

Antennae short to moderate; composed of twenty to twenty-eight articles.

No ocelli present.

Prosternal teeth 2 + 2; line of apices recurved. Spines slender and bristle-like.

None of the dorsal plates with caudal angles produced.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods long and slender; bipartite (subentire) or tripartite, the lateral tooth small and situated well proximad. Spines 2 + 2; long and slender, attenuated from base distad.

Tarsi of anterior legs slender; distinctly divided and the distal segment more slender.

Only the last pair of coxae laterally armed. Third joint of first eight to eleven pairs of legs with but two dorsal spines, or the most anterior one to three with but one. Fifth joint of all legs between third and thirteenth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; claw single, long. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 2, 1; one accessory claw which is very small or obsolete. Dorsal spines of thirteenth legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of twelfth legs 0, 0, 3, 1, 2; ventral 0, 0, 3, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 or 0, 0, 2, 2, 1; ventral 0, 0, 2, 2, 1 or 0, 0, 2, 3, 1.

Length 8 to 11 mm.

Type.— *T. kebus,* sp. nov.

The two species for which this genus is established are small, much alike in general appearance, and characteristically slender, being 9.5 or 10 times longer than the width of the tenth plate. They are light

FIG. 2.— Distribution of Typhlobius.

yellow in color with the head pale orange. Their habits are not known; but the absence of eyes and the weak pigmentation would indicate that they are probably more strongly lucifugous than usual.

Key to Species of Typhlobius.

a. Articles of antennae twenty; trochanter of thirteenth legs with a spine; ventral spines of anal legs 0, 1, 3, 2, 1 . . *T. kcbus*, sp. nov.

aa. Articles of antennae twenty-eight; trochanter of thirteenth legs unarmed; ventral spines of anal legs 0, 1, 3, 2, 0.
T. coecus (Bollman).

TYPHLOBIUS COECUS (Bollman).

Plate 3, fig. 7; Plate 4, fig. 1, 2.

Lithobius coecus Bollman, Ann. N. Y. acad. sci., 1888, 4, p. 111. Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 36.

DESCRIPTION.— Dorsum yellow of dilute orange cast. Head more distinctly orange. Antennae light distally, proximally approaching the head in color. Prosternum like head but a shade lighter. Venter a little paler than dorsum, the caudal plates more distinctly orange than the others. Legs yellow, the caudal pairs most densely pigmented.

Body slender, usually ten times longer than width of tenth plate or a little less. Head as wide as, or wider than, the tenth plate and the third plate narrower than the first. Widths of head and of first, third, eighth, and tenth plates in a female measured as 25 : 22 : 21 : 23 : 24 : 23; in a male as 28.5 : 26 : 24 : 27 : 27 : 25.

Head cordate, conspicuously narrowed from caudal edge of eyes cephalad. Equal in length and breadth.

Antennae of moderate length; strongly attenuated distad. Articles mostly twenty-eight which are short and often submoniliform. Bristles long and subdense.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.25 times width at level of bottom of mesal incision; four times length of the dental line. Median incision v-shaped, its sides from moderately concave to nearly straight. Teeth moderate in size, the mesal one of each pair a little larger than the outer, acute; line of apices a little recurved. Spine inserted at base of outer tooth, small and slender.

First dorsal plate about 1.65 times wider than long. Caudal margin of ninth, eleventh, and thirteenth plates a little curved forwards at ends, the corners being rounded.

Coxal pores small, the most proximal ones often much reduced: 3, 3, 3, 3; 2, 3, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 2,\ 2,\ 1}$; of the second, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the third, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the fourth and fifth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 1}$; of the sixth to eighth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the ninth to eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 2,\ 1}$; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 0}$. Last pair of coxae laterally armed.

Posterior legs of male short. Penult laterally somewhat compressed, distinctly longitudinally sulcate on the caudal, or mesal, side; fourth joint raised along dorsal surface into a ridge which is elevated at distal end.

Claw of female gonopods long and acute, with a single small acute tooth near base on outer or ventral edge. Spines 2 + 2; long, the outer larger than the inner; slender, attenuated from base to tip.

Length 8.5 to 11 mm.

Type Locality.— Tennessee: Beaver Creek. Also taken in North Carolina at Saluda.

In Bollman's description of the type the following differences may be noted: ventral spines of anal legs 0, 1, 3, 1, 0 and of the penult 0, 1, 3, 2, 0, a spine probably having been overlooked on fourth joint of the anal and on fifth of the penult.

Typhlobius kebus, sp. nov.

Plate 3, fig. 5, 6.

Description.— Dorsum very dilute yellow, the pigment a little denser on the first one and the several most caudal plates. Head light orange-yellow. Antennae yellowish proximally, whitish distally. Prosternum like head but a little paler. Venter similar to dorsum, the caudal plates, as usual, more densely pigmented. Legs with faint yellow tinge.

Body very nearly 9.5 times longer than width of tenth plate, being very slender and appearing almost parallel-sided, with the head wider than any dorsal plate and the first plate wider than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 30 : 27 : 26 : 26 : 27 : 26.

Head nearly equal in length and breadth, being slightly wider.

Widest a little in front of marginal breaks and strongly narrowed cephalad. Hairs long, very sparse.

Antennae short, attaining the fifth segment. Distal portion unusually slender. Articles twenty, moderately short, the distal ones slender and almost strictly cylindric. Ultimate article very long.

Organ of Tömösvary in usual position; not enlarged.

Prosternum with median incision very narrow and relatively deep, its sides straight. Teeth moderately large and well chitinized; inner tooth of each pair distinctly larger than the outer; line of apices recurved; ectal side of outer tooth nearly parallel with longitudinal axis while the inner edge is very oblique, the reverse being true of the inner tooth (Plate **3**, fig. 5). Spine small and bristle-like, straight. Prosternum 1.52 times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of mesal incision; 3.8 times as great as length of dental line.

First dorsal plate 1.8 times wider than long; sides moderately convex and diverging cephalad. Minor plates with caudal corners subrectangular or simply rounded. Plates very sparsely clothed with short hairs, and along margins, with some longer hairs.

Coxal pores very small: 3, 4, 4, 3.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of the second, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$, or $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the third to eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 3,\ 1,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 2,\ 1}$, one accessory claw present, this being very small and the main claw long; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, claw long. Last pair of coxae laterally armed.

Claw of female gonopods of moderate size, only slightly curved; distally showing two blunt teeth or lobes separated by only a slight reentrant angle and the outer larger than the inner; farther toward base is a small tooth on the ventral or outer edge. Basal spines 2 + 2.

Length 9.25 mm.

Type.— M. C. Z., No. 151. California: Santa Barbara.

Pampibius, gen. nov.

Head with lateral marginal breaks well marked.

Antennae short; in type species composed normally of twenty-four articles.

Ocelli present; seriate; single ocellus not largest.

Prosternal teeth 2 + 2; spines slender and distally bristle-like.

Posterior angles of none of the dorsal plates at all produced.

Fig. 3.— Distribution of Pampibius.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods tripartite. Basal spines 2 + 2, long and slender. First article not excavated proximally.

Tarsi of anterior legs undivided.

In the male the fourth joint is conspicuously crassate, and bears a lobe at proximal end from which projects a brush of very long hairs.

Last two pairs of coxae laterally armed. Third joint of first ten pairs of legs with but one dorsal spine, that of only last two pairs with three, that of about first seven pairs unarmed ventrally. Fifth joint of first eleven pairs of legs, or of all these excepting first one or two, with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 0; claw single. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 2, 1 or 0, 1, 3, 2, 0; claw single. Dorsal spines of twelfth legs, 0, 0, 2, 1, 1; ventral 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 1, 2, 2 or 0, 0, 1, 1, 1; ventral, 0, 0, 0, 1, 1.

Length of type species 6.5–7 mm.

Type.— *P. paitius* (Chamberlin).

Only one species, found in North Carolina and Tennessee, is at present known.

Pampibius paitius (Chamberlin).

Plate **3**, fig. 1–4.

Lithobius paitius Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 37, pl. 3, fig. 6.

Description.— Dorsum pale brown. Head and posterior segments dark orange. Antennae dull yellow. Venter grey or greyish yellow. Legs pale, greyish, excepting the posterior pairs which are bright yellow, with the brush of hairs on the anal legs of male reddish proximally and yellow distally.

Body a little narrowed cephalad, with the first plate narrower than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 50 : 45 : 47 : 53 : 52 : 50.

Head subcordate; caudal margin mesally distinctly incurved; moderately narrowed and rounded cephalad. Marginal breaks proportionately large and distinct. Wider than long in ratio 45 : 42.

Antennae short. Composed normally of twenty-four articles which are short between the second and the ultimate, and decrease distad; often submoniliform; ultimate article rather slender, moderately acuminate, clearly longer than the two preceding together.

Ocelli six to nine in two, or sometimes in three, series: *e.g.*, 1 + 4, 1;

1 + 4, 2; 1 + 4, 3, 1. Single ocellus smaller than any of upper series, or equal to most anterior. Ocelli of lower series very small (Plate **3**, fig. 2).

Prosternum with median incision very narrow and sides nearly parallel in same. Teeth of each pair widely separated. Spine acutely acuminate, attached caudad of outer edge of outer tooth (Plate **3**, fig. 1); 1.7 times wider than long. Distance between chitinous spots 2.25–2.32 times width at level of bottom of mesal incision; near 4.25 times the dental line.

First dorsal plate 1.8+ times wider than long; sides very convex; strongly narrowed caudad, with posterior corners strongly rounded. Caudal corners of ninth and eleventh dorsal plates rounded or shortly excised; those of thirteenth with caudal edge straight.

Coxal pores small: 1, 3, 3, 2; 1, 3, 3, 3; 1, 3, 4, 3; 2, 3, 3, 2; 2, 3, 3, 3; 2, 3, 4, 3; 2, 4, 4, 3; etc.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,1,1}$ or $\frac{0,0,1,2,2}{0,0,0,1,1}$; of the second, $\frac{0,0,1,2,2}{0,0,0,2,1}$; of the third, $\frac{0,0,1,2,2}{0,0,0,2,1}$, or $\frac{0,0,1,2,2}{0,0,0,3,1}$; of the fourth to sixth, $\frac{0,0,1,2,2}{0,0,0,2,2}$; of the seventh, $\frac{0,0,1,2,2}{0,0,0,2,2}$ or $\frac{0,0,1,2,2}{0,0,0,3,2}$; of the eighth to tenth, $\frac{0,0,1,2,2}{0,0,1,3,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,2,1}$ or $\frac{1,0,3,1,1}{0,1,3,2,0}$, claw single; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw single. Last two pairs of coxae laterally armed.

In the anal legs of the male the third joint is clavately thickened and the fourth joint, in particular, is rather strongly crassate; the latter joint has at its proximal end on the dorsomesal side a lobe on the posterior surface of which is born a dense brush of very long hairs which extend caudad to or beyond the distal end of the joint (Plate **3**, fig. 3).

Claw of female gonopods short; parallel-sided; well curved; tripartite, with the lateral lobes equal and not much shorter than the median. Spines relatively long and slender, the sides a little incurving at middle, apical acuminate portion short with denticle on each side at base; the two of each pair of nearly same length (Plate **3**, fig. 4).

Length 6.5–7 mm.

Type Locality.— Tennessee: Unaka Springs.

Also taken in North Carolina at Catawba.

Paitobius Chamberlin.

Can. ent., 1912, **44**, p. 175.

Head with distinct marginal lateral interruptions.

Antennae short but often reaching seventh or eighth segment; composed of from twenty-six to thirty-four articles.

Ocelli from seven to twenty in from two to four series; single ocellus enlarged.

Prosternal teeth 2 + 2; line of apices typically more or less procurved, the inner tooth of each pair being borne farther cephalad than the outer (Plate **4**, fig. 3, 5). Spines distally bristle-like, median incision v-shaped.

Of the dorsal plates the posterior angles of ninth, eleventh, and thirteenth; of seventh, ninth, eleventh, and thirteenth; of sixth, seventh, ninth, eleventh and thirteenth, or sometimes of only the eleventh and thirteenth, are produced.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claws of female gonopods tripartite or rarely only bipartite; basal spines 2 + 2, slender, acuminate from base. First article not excavated at base.

Tarsi of all legs divided.

Posterior legs of male not specially modified. Third to fifth article of anal legs more or less distinctly longitudinally furrowed above, a little more crassate in male.

Last one or two pairs of coxae laterally armed. Third joint of first six to eleven pairs of legs with two dorsal spines, or occasionally the first one to three pairs, and in one species the first eleven pairs, with but one dorsal spine or first one or two with none; others with three. Fifth joint of all legs between the second or third and twelfth or thirteenth pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 1 or 0, 1, 3, 2, 0, rarely 0, 1, 3, 3, 1; claws two or sometimes but one. Dorsal spines of penult legs 1, 0, 3, 1, 1, less commonly 1, 0, 3, 1, 0, 1, 0, 2, 1, 1 and even 1, 0, 3, 2, 1; ventral 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws two or three. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or 0, 0, 3, 2, 2 to 0, 0, 3, 1, 2 and 0, 0, 2, 1, 2. Dorsal spines of first legs 0, 0, 0, 1, 1 to 0, 0, 2, 2, 1; ventral 0, 0, 0, 0, 0 to 0, 0, 1, 2, 1, the usual formula.

Length of species 6.5 to 12 mm.

Type.— *P. carolinae* (Chamberlin).

The species of this genus, even in the case of the adults, in most cases show a purplish pigment which, at least in alcoholic specimens, tinges the muscles distinctly and modifies the color of the entire body, but is most evident in the anterior ventral plates, antennae and head, and the caudal pairs of legs. The anal legs are always dark proximally with the tarsi, or the tibiae and tarsi, conspicuously paler and usually yellow. The head and dorsum are smooth and shining, never rugose.

FIG. 4.— Distribution of Paitobius.

The species occur chiefly in the southeastern states, though one is known from Pennsylvania and another from New York City (Figure 4).

The species embraced under the fourth division (*aaaa*) in the following key may be regarded as constituting a separate subgenus, Tunabius (*P. zinus* Chamberlin, TYPE) differing from Paitobius *sens. str.*, including all the remaining species, in having either none or only the eleventh and thirteenth of the dorsal plates produced and in having the line of apices of prosternal teeth typically straight or slightly recurved.

Key to Species of Paitobius.

a. Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced.
Ventral spines of anal legs 1, 3, 2, 1; of penult, 1, 3, 3, 2; dorsal spines of thirteenth legs 1, 0, 3, 2, 2. . . *P. arienus* (Chamberlin).

aa. Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced.

b. Ventral spines of anal legs 1, 3, 3, 1; of the penult 1, 3, 3, 1. *P. juventus* (Bollman).

bb. Ventral spines of anal legs 1, 3, 2, 0; of the penult, 1, 3, 2, 1. *P. carolinae* (Chamberlin).

aaa. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced.

b. Anal leg with the claw single.
Ventral spines of anal legs 1, 3, 2, 1; of the penult, 1, 3, 3, 2; third joint of all legs with two or three dorsal spines. *P. naiwatus* (Chamberlin).

bb. Anal leg with two claws.

c. Ventral spines of anal legs 1, 3, 2, 1 and of penult 1, 3, 3, 2.

d. Dorsal spines of thirteenth legs 1, 0, 3, 2, 2; dorsal spines of first legs 2, 2, 1; third joint of first seven pairs of legs with two dorsal spines. . . . *P. tabius* (Chamberlin).

dd. Dorsal spines of thirteenth legs 0, 0, 3, 1, 1 or 1, 0, 3, 1, 1; dorsal spines of first legs 2, 1, 1; third joint of first eleven or twelve pairs of legs with two dorsal spines. *P. adelus,* sp. nov.

cc. Ventral spines of anal legs 1, 3, 2, 0; of the penult also 1, 3, 2, 0. . . . . *P. simitus* (Chamberlin).

aaaa. Posterior angles of only eleventh and thirteenth or of none of the dorsal plates produced. . . . . *Tunabius,* subgen. nov.

b. Anal leg with the claw single.

c. Ventral spines of penult legs 1, 3, 3, 1; third joint of first eleven pairs of legs with 2 dorsal spines.
P. watsuitus (Chamberlin).

cc. Ventral spines of penult legs 1, 3, 2, 0; third joint of first eleven pairs of legs with only one dorsal spine.
P. atlantae, sp. nov.

bb. Anal leg with two claws. (Ocelli ten or more in three series).

c. Dorsal spines of penult and of thirteenth legs 1, 0, 2, 1, 1; ventral spines of penult legs 1, 3, 2, 1; dorsal spines of twelfth legs, 0, 0, 2, 1, 2.....*P. exceptus*, sp. nov.

cc. Dorsal spines of penult and of thirteenth legs 1, 0, 3, 1, 1; ventral spines of penult legs, 1, 3, 3, 1; dorsal spines of twelfth legs 0, 0, 3, 2, 2 or 0, 0, 2, 2, 2.
P. zinus (Chamberlin).

The key does not include *P. exiguus* (Meinert). (*Cf.* p. 302).

Paitobius arienus (Chamberlin).

Lithobius arienus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 47.

Description.— Dorsum brown, darkened caudad and sometimes, though less, cephalad. Head from brown and but little darker than the dorsum, with a transverse band along the frontal suture palest, to a darker, dusky or dull purplish, brown. Antennae brown suffused as usual, with purplish, distinctly darkened distad to the ultimate article, which is alone paler. Venter pale testaceous to brown, becoming, as usual, darker caudad, and the last several segments much darker, of a somewhat burnt brown tinge; anterior segments showing a weak violaceous or purplish tinge. Prosternum testaceous, not at all, or but little, darker than anterior sternites, or appearing in some dusky from a dull purplish pigment; prehensors paler ectad and distad, excepting the claw. Legs testaceous, with the tarsi more pigmented, or they may be suffused with the purplish pigment; anal legs much darker, deep purplish brown, but with the tarsi lighter.

Body robust, being seven times, a little more or less (♂), as long as width of the tenth dorsal plate; conspicuously narrowed from the eighth segment cephalad to the first. Eighth and tenth plates of equal width, much wider than the head; first plate clearly narrower than the third. Widths of head and of first, third, eighth, and tenth plates to each other as 41 : 39 : 43 : 46 : 50 : 50.

Head wider than long in about ratio 41 : 38. Subcordate, widest at marginal breaks. Caudal margin a little incurved mesally. A transverse furrow a little in front of and parallel with caudal marginal rim, its ends curving forwards to lateral breaks. A broad furrow on each side parallel with lateral margin as far forward as eye, and also a furrow each side of middle extending cephalad from transverse furrow. Smooth and shining, punctae few and indistinct.

Antennae reaching the seventh segment. Articles thirty-two to thirty-four, of moderate length; gradually decreasing in size from the second distad to the ultimate.

Ocelli fourteen to twenty in four or five series: *e. g.*, 1 + 4, 3, 3, 3, 1; 1 + 4, 4, 3, 3, 2; 1 + 5, 5, 5, 3, 1. Single ocellus much the largest, subvertically oval, with the narrower end ventrad. Seriate ocelli decreasing in size ventrad as usual.

Prosternum 1.5+ times wider than long. Teeth proper small and dark, but elevated on the usual obtusely angular protrusions of the anterior margin; line of apices distinctly procurved.

Sixth, seventh, ninth, eleventh, and thirteenth dorsal plates with posterior angles strongly produced, the processes of the sixth being more acute than those of the seventh. Major plates depressed along lateral and caudal borders. On elevated portion of each plate in front of caudal depressed border a transverse sulcus continuous at each end with a sublongitudinal sulcus running a little ectad of cephalad; and mesad of the latter are two other sulci the inner of which diverges from its mate of the opposite side caudad.

Sternites with a median longitudinal furrow most distinct on anterior portion of plate and a submarginal furrow as usual on each side. Two transverse furrows, one near middle and one a little cephalad of caudal margin.

Coxal pores small and circular: 3, 4, 4, 3; 4, 5, 5, 3; 4, 5, 5, 4.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second to fourth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 2}$; of the fifth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 2}$ (or, in one specimen on one side only, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 2}$); of the sixth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$; of the seventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the eighth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the ninth and tenth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$ or $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; claws two; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$, claws two. Last two pairs of coxae laterally armed.

Male with anal and penult legs, as usual, moderately crassate. Fourth joint of anal legs thickened and dorsally complanate, with a conspicuous median longitudinal dorsal furrow, the third and fifth articles also similarly but more weakly furrowed. Corresponding articles of penult legs similarly but less strongly modified.

Gonopods of male showing a pale, conical, and apparently glabrous process extending caudoectad a little beyond edge of sternite, or sometimes wholly covered by the latter.

Length of types 10.5 to 11.5 mm. A specimen 10.5 mm. long has antennae 5 mm. long; anal legs (exclusive of coxae) 4.5 mm. long; tenth plate 1.6 mm. wide.

Type Locality.— North Carolina: Hot Springs, August 6, 1910.

Also taken in South Carolina at Taylors, August 3, 1910.

The female of this species is as yet unknown.

Paitobius juventus (Bollman).

Lithobius juventus Bollman, Proc. U. S. N. M., 1887, **10**, p. 263, 1888, **11**, p. 342, 1889, **11**, p. 410. Chamberlin, Can. ent., 1911, **43**, p. 99, 101.
Paitobius juventus Chamberlin, Can. ent., 1912, **44**, p. 175.

Description.— Brown. Head darker. Antennae brown proximally, fulvous at tips. Venter yellowish to brown. Legs like adjoining portion of venter; posterior legs apparently paler distally. Prehensors paler than prosternum.

Body about 7.25 times longer than width of tenth plate. Width of head and of first, third, eighth, tenth, and twelfth plates to each other as 50 : 47 : 49 : 59 : 61 : 56.

Head longer than wide in about ratio 52 or 53 : 50. Sides strongly rounded from breaks caudad about corners. Posterior portion of head with two longitudinal sulci diverging cephalad.

Antennae short. Articles, in type, thirty-one to thirty-two; short.

Ocelli 1 + 53; 1 + 4, 3, 3. Single ocellus moderate in size, the most caudal of uppermost series large.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2 times width at level of bottom of median incision; 3–3.25 times the dental line. Line of apices conspicuously procurved as usual.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced, the processes of the last three being especially acute. Posterior margin of sixth plate straight.

Coxal pores small, circular; in types: 3, 4, 4, 3 and 4, 4, 4, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the second and third, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth to tenth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the eleventh and twelfth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{0\ (1),0,3,1,1}{0,1,2,3,2,1}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$ or $\frac{1,0,3,1,0}{0,1,3,3,1}$, claws two. In types, which are in poor condition, no lateral spines are detectable on posterior coxae but they may have been lost.

Claw of female gonopods of moderate length, rather wide, tripartite, the lateral lobes small and acute, the outer one being a little more proximal in position, and the median one longest and much broadest, acute. Basal spines slender, long and acutely pointed, subequal.

Gonopods of male small and wart-like, almost completely concealed.

Length 6.5–9 mm. A female 8 mm. long has antennae 3 mm. long, anal legs 3.5— mm. long; and tenth plate 1.1+ mm. wide.

Type Locality.— Indiana: Bloomington (Bollman coll.).

Also taken in Tennessee at Mossy Creek (C. B. Branner coll.).

The description above is based upon two of the four type specimens from Bloomington.

Paitobius carolinae (Chamberlin).

Plate **4**, fig. 5, 6.

Lithobius carolinae Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 47.
Paitobius carolinae Chamberlin, Can. ent., 1912, **44**, p. 175.

Description.— Dorsum from pale yellowish brown to dark brown and light chestnut, the posterior and anterior plates, especially the first one, darker and usually tinged with red or purplish red. Head dull purplish red to reddish chestnut, paler in a characteristic band along the frontal suture. Antennae dull purplish red proximally but pale distad. Prosternum dull brown of reddish tinge; prehensors paler ectad, testaceous, or with slight tinge of ferruginous. Venter from dilute brown or brownish grey to darker burnt brown, the more caudal plates darker and having the characteristic reddish tinge, while the anterior plates are often suffused with purplish. Legs nearly like corresponding portions of venter, becoming darker caudad, but the anal and penult pairs yellowish distad.

Body conspicuously narrowed from the eighth segment cephalad as usual. Tenth and eighth plates nearly equal in width, clearly wider than the head. 7.25 to 7.5 times longer than width of tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 32 : 29 : 30 : 37.5 : 37.

Head suborbicular; almost precisely equal in length and breadth. Caudal margin straight. Somewhat depressed transversely in front of caudal marginal thickening and longitudinally a little mesad of each lateral margin and also a little each side of the median line, the depressions usually wide and shallow. Head smooth and shining, the few punctae present being very fine. Hairs sparse, in part long.

Antennae short, reaching to the sixth or the beginning of the seventh segment. Composed mostly of from thirty to thirty-five articles which distad of the third are short and very short, the shortest ones often alternating singly or in groups with longer ones.

Ocelli from eleven to sixteen in three or, less commonly, in four series: *c. g.*, 1 + 5, 4, 3; 1 + 4, 3, 3; 1 + 5, 4, 3, 3. Single ocellus moderate in size, a little obliquely elliptic, commonly not much larger than the most caudal one of the uppermost series which, as usual, is elongate longitudinally; other ocelli decreasing in size cephalad and ventrad.

Prosternum 1.5 times wider than long or slightly wider. Teeth proper small but borne forwards as usual, with the line of apices distinctly procurved. Spines in usual position, bristle-like distally.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced, the processes of the last three being acute, those of the seventh more obtuse. Posterior angles of sixth plate typically rounded or somewhat excised. All major plates furrowed transversely a little in front of caudal margin and longitudinally within each lateral margin. Elevated portion of each plate with a longitudinal furrow a little each side of median line and a second one farther ectad. Otherwise the plates are smooth and shining, not at all rugose. Hairs very short and sparse.

Ventral plates longitudinally depressed or furrowed between median line and each lateral margin, the furrows most distinct caudad. Anterior plates transversely depressed between bases of legs and, on more caudal plates, a second transverse furrow appearing as usual, in front of the caudal margin.

Coxal pores circular, the most proximal on each coxa often very small: 3, 4, 4, 3; 4, 5, 5, 4; 4, 5, 4, 3.

Tarsi of all legs biarticulate, but those of anterior pairs with division often indistinct. Anal and penult legs short, considerably inflated in both sexes, but somewhat more so in the male. In both the femur is widened and is more or less flattened above and longitudinally furrowed, the prefemur and tibia likewise distinctly longitudinally furrowed. Penult leg similarly furrowed, but less crassate. Thirteenth legs with third, fourth, and fifth joints longitudinally furrowed above toward each side, the two furrows leaving a low ridge-like elevation between them. The other legs similarly furrowed but less and less distinctly so in going cephalad, the legs being more or less distinctly laterally compressed and somewhat furrowed longitudinally along sides of joints.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,2,1}$, rarely $\frac{0,0,2,2,1}{0,0,0,1,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third to seventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the eighth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,3,2,2}{0,0,1,2,1}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ to $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,3,2}$ or, rarely, on one side, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,2,1}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$ (or in a partly regenerated leg observed also as $\frac{1,0,3,0,0}{0,1,3,0,0}$), claws two. Last pair of coxae laterally armed.

Claw of female gonopods short and relatively rather broad, thin, and well curved; tripartite, the outermost, or most ventral, lobe smallest and sometimes almost obliterated, the median considerably longest, all acute. Basal spines moderately long and slender, the inner usually somewhat more slender than the outer; both gradually narrowing distad from base to more acuminate apical portion, with edges of latter portion sometimes minutely denticulate.

Length 8.5 to 10 mm. A female 9.5 mm. long has antennae 3.8 mm. long; anal leg 3.2 mm. long; and tenth plate 1.3 mm. wide.

Praematurus.— Testaceous or pale brown, with anterior and posterior plates reddish. Head brownish to dull purplish red, with the transverse pale band along the frontal suture as in the adult. Antennae from light to dark dull purplish red, pale distad. Prosternum and prehensorial feet as in *maturus*. Venter pale testaceous, the anterior plates suffused with light purple, the caudal plates darkened as usual. Caudal pairs of legs dark proximally and light, yellowish, distad.

Antennae as in adult or nearly so, the number of articles complete, short, and very short.

Ocelli 1 + 4, 3, 2; 1 + 4, 3. Single ocellus frequently smaller than most caudal one of upper series, which is large. Ocelli of most ventral row small.

Prosternum as in adult.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced acutely, those of the seventh somewhat more weakly produced than in the adult.

Coxal pores: 3,3,4,3; 3,4,4,3; small, the most proximal especially so.

Claw of female gonopods shorter and less curved than in adult, pale and thin; the three lobes distinct but the outermost minute and the median much the longest, all acute. Spines nearly conical, uniformly narrowing from base to apex, the inner spine on each side only about one fifth shorter than the outer, the two spines in this form appearing to develop more nearly simultaneously than is usual in most of the Lithobiidae. Bristles fewer than in *maturus*.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,1,1}$ to $\frac{0,0,1,1,1}{0,0,0,0,0}$; of the second to fourth, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,2,1}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,0,2,1}$; of the sixth and seventh, $\frac{0,0,2,2,2}{0,0,0,2,1}$; of the eighth, $\frac{0,0,2,2,2}{0,0,0,2,1}$ or $\frac{0,0,2,2,2}{0,0,0,2,2}$; of the ninth, $\frac{0,0,2,2,2}{0,0,0,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the tenth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,0,2,1}$ or $\frac{0,0,2,2,2}{0,0,0,2,2}$; of the twelfth, $\frac{0,0,2,1,2}{0,0,0,2,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2\,(1)}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,2,1}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$.

Length 7 to 7.5 mm. A specimen 7 mm. long has antennæ 3.25 mm. long; and anal legs 2.75 mm. long.

Type Locality.— North Carolina: Asheville.

Found also in North Carolina at Hot Springs. South Carolina: Landrum. Tennessee: Russellville.

The statement (Ann. Ent. soc. Amer., 1911, **4**, p. 47) that the angles of the sixth plate are produced was due to several specimens of *arienus* (from Taylors, S. C.) having been included in the description.

Paitobius naiwatus (Chamberlin).

Plate **4**, fig. 3, 4.

Lithobius naiwatus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 42.
Paitobius naiwatus Chamberlin, Can. ent., 1912, **44**, p. 175.

Description.— Dorsum from light brown to dark brown and chestnut, the caudal segments darkest, often dark brownish purple. Head from dark brown, in the paler specimens, to deep purplish brown or purplish chestnut in the darker ones; mostly uniform, but the frontal region sometimes a little lighter. Antennae concolorous with head proximally, becoming pale distad, the end portion being from yellow to rufous. Venter yellowish brown to brown, the sternites normally becoming darker from the anterior ones caudad, the last four or five plates being especially dark, often dull reddish brown. Prosternum dark brown, usually suffused with purplish; prehensors paler, light ferruginous or rufous distad. Legs yellow to brown, the last two pairs dark purplish brown to purplish black excepting the tarsi, or tibiae and tarsi, which are light.

Body robust, being relatively very wide; conspicuously narrowed cephalad; typically only about six times longer than width of the tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 87 : 80 : 77 : 95 : 100.

Head widest between eyes and marginal breaks as usual. Caudal margin nearly straight. Smooth and shining, not at all roughened; a few minute and scattered punctae. Equal in length and breadth, or slightly wider.

Antennae of moderate length, normally reaching to the eighth segment, or sometimes to the ninth. Articles beyond the second of moderate length and either uniform throughout or those of the distal two thirds may be considerably shorter than the others. Articles from thirty-two to thirty-six. Bristles long, not very dense.

Ocelli ten to sixteen in three or four series: *e. g.*, 1 + 4, 3, 2; 1 + 4, 4, 4; 1 + 4, 4, 3, 1; 1 + 4, 3, 3, 2; 1 + 4, 4, 4, 3. Single ocellus much the largest, subvertically elliptic, often paler than the others. Series regular, the ocelli of the most dorsal one often separated by a small space from each other, especially so those toward the caudal end. Organ of Tömösvary in outline of about same size as an average sized ocellus, a little cephaloventrad of eye-patch.

Prosternal teeth 2 + 2 or rarely 1 + 2; those of each pair separated by a rather wide space; margin extended beneath each tooth; line of apices procurved. 1.6 times wider than long.

All major dorsal plates with a lateral longitudinal furrow parallel with, and but little removed from, lateral margin, and all but the first with a sublongitudinal furrow each side of the middle running from anterior end obliquely ectocaudad, a third weaker furrow being also more or less evident between this and the submarginal one. Not roughened. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced.

Ventral plates, excepting the first one, with a distinct median longitudinal sulcus impressed only at anterior end on the more cephalic sternites but becoming longer and more distinct on the caudal ones. On the more caudal sternites there is commonly a deep impression in the form of an inverted v which is most acute on the last plates, the mark becoming more obtuse and less and less distinct in going forwards.

Coxal pores mostly small, pale edged, strictly circular, decreasing proximad on each coxa as usual: 3, 4, 4, 3; 4, 4, 5, 4; 4, 5, 5, 4; 5, 5, 5, 4; 5, 6, 5, 4; etc.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the fourth and fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the seventh to the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 1, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws two; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, the claw single. Only the last pair of coxae laterally armed.

Anal and penult legs in male short, moderately thickened, with the tarsi more or less abruptly more slender; fourth joint clavately thickened, dorsally a little complanate and longitudinally furrowed above, the corresponding article of penult legs being similarly furrowed but

not enlarged. These legs are similar in the female but are less thickened and have the furrows weaker.

Claw of female gonopods rather slender and thin; tripartite, the lobes acute, with the median longest. Spines of each pair equal in size or nearly so; moderately narrowing from base to distal third and then more abruptly running to an acute point.

Gonopods of male broad at base; distally broadly rounded to subconic.

Length from 9.5 to 13 mm.

Pseudomaturus.— Coloration similar to that of adult but prevailingly somewhat paler throughout.

Antennae as in adult but articles relatively somewhat shorter.

Ocelli 1 + 443; 1 + 5, 4, 3; larger than in the *praematurus.*

Coxal pores: 3, 4, 4, 3 to 4, 5, 5, 4, small.

Claw of female gonopods smaller and paler than in adult, especially in specimens toward the *praematurus* stage, with lateral lobes relatively somewhat smaller. Basal spines as in adult, or the inner one of each pair a little more slender and shorter relatively.

Spining of legs in older specimens as in adult while youngest ones may have formulae as follows:— fourth and fifth pairs, $\frac{0,0,2,2,1}{0,0,1,3,2}$ or $\frac{0,0,2,2,2}{0,0,1,3,2}$; seventh and eighth, $\frac{0,0,2,2,2}{0,0,1,2,2}$ or $\frac{0,0,2,2,2}{0,0,2,2,2}$; ninth, $\frac{0,0,2,2,2}{0,0,2,2,2}$; tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,2,2}$; twelfth, $\frac{0,0,3,1,1}{0,0,2,3,2}$; thirteenth, $\frac{1,0,3,1,2(1)}{0,1,3,3,2}$; penult, $\frac{1,0,3,1,0}{0,1,3,3,2}$; anal as in adult. Last pair of coxae laterally armed.

Length 7.5 to 9 mm. (Saluda, N. C.).

Praematurus.— Dorsum brown. Head chestnut suffused with purple. Antennae dark like the head but more distinctly purplish proximally; light distally. Prosternum brown, the prehensors lighter, especially distad. Venter pale greyish yellow to yellowish brown, more brown caudad. Legs pale, the two last pairs darker and suffused with purple proximally, yellowish distally.

Antennae composed of thirty to thirty-one articles which are mostly of moderate length as in adult, but shorter ones occur at intervals in pairs.

Ocelli ten to thirteen in three series: *e. g.*, 1 + 4, 3, 2; 1 + 5, 3, 3; 1 + 5, 4, 3. Of the seriate ocelli the most caudal one of top series is relatively large.

Coxal pores very small, pale: 3, 4, 4, 3.

Claw of female gonopods pale throughout, moderately curved, the three lobes present but the median one much exceeding the lateral ones, which appear as small but distinct teeth. Inner spine of each pair about one half the length of the outer one.

Spines of first legs, $\frac{0,0,1(0),1,1}{0,0,0,0,1(0)}$; of the second, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the third and

fourth, $\frac{0,0,2,2,1}{0,0,0,1,1}$; of the fifth, $\frac{0,0,2,2,1}{0,0,0,2,1}$; of the sixth to eighth, $\frac{0,0,2,2,2}{0,0,0,2,1}$; of the ninth, $\frac{0,0,2,2,2}{0,0,0,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the tenth and eleventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the thirteenth, $\frac{0,0,2,1,1}{0,1,2,2,2}$; of the penult, $\frac{0,0,1,0,0}{0,1,3,2,0}$ or $\frac{0,0,1,1,0}{0,1,3,2,0}$; of the anal, $\frac{0,0,3,0,0}{0,1,3,1,0}$, $\frac{0,0,3,0,0}{0,1,3,2,0}$, or $\frac{0,0,1,0,0}{0,1,2,1,0}$. No lateral spine as yet manifest on last coxae.

Length near 7 mm.; antennae 3.5 mm.; anal legs cir. 2.5 mm. (Linville Falls, N. C.).

Type Locality.— North Carolina: Saluda.

Found also in North Carolina at Catawba and Linville Falls. South Carolina: Landrum. Georgia: Tallulah Falls.

Paitobius tabius (Chamberlin).

Plate 5, fig. 1.

Lithobius tabius Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 44.

Description.— Dorsum dark brown, either not at all or but slightly darker caudad. Head and first dorsal plate much darker, chestnut of a dull purplish red tinge. Antennae concolorous with head, pale distad. Venter light brown anteriorly, becoming darker and darker caudad; in some the entire venter is suffused with purplish. Legs pale brown, paler ventrally than dorsally, with tarsi yellow; often suffused with purplish; legs becoming darker caudad, the two last pairs especially deep in color, brown of a dull purplish cast, with the tarsi orange or light ferruginous. Prosternum similar in color to the head but of a somewhat paler shade, the prehensors lighter, dull ferruginous. The characteristic reddish purple tint may be more or less evident throughout the body.

Body considerably and uniformly narrowing from the tenth plate cephalad, with the head and the tenth plate of nearly the same width. Body typically near seven times as long as the width of the tenth plate. Widths of head and of first, third, eighth, and tenth, plates to each other as 43 : 36 : 36 : 42 : 43.

Head suborbicular, with the sides conspicuously and rather evenly convex and the caudal margin weakly excurved. Equal in length and width or very nearly so, widest between eyes and marginal breaks. Head usually rather broadly and shallowly depressed a little each side of the median line from near caudal margin a variable distance cephalad. Not at all punctate or rugose, smooth and shining.

Antennae short, reaching toward end of seventh segment or, occasionally, only to the fifth. Articles between the second and ultimate

moderately short, not much varying in proportions; in number mostly from thirty to thirty-four.

Ocelli nearly always in four series, occasionally in but three; from fourteen to twenty in number: *e.g.*, 1 + 4, 4, 3, 3; 1 + 4, 4, 4, 3; 1 + 4, 4, 5, 4; 1 + 4, 5, 4; 1 + 4, 5, 3. Single ocellus well separated, not larger than most caudal one of most dorsal series. Ocelli of caudal portion of most dorsal series much larger than the others, longitudinally more or less elongate. Ocelli decreasing markedly in size from above ventrad and in each series from caudal end cephalad.

Prosternum 1.5 times wider than long. Distance between chitinous spots 2.25 times greater than width at level of bottom of median incision; 3.2 times the dental line. Line of apices procurved in the typical manner. Spine distally bristle-like.

First dorsal plate smooth and shining; a transverse furrow a little in front of caudal margin curving cephalad at each side and extending to anterior border. Other major plates marked with a pair of distinct longitudinal furrows on the median portion, with, between them, a more shallow median furrow, all the furrows becoming deeper on the more caudal plates; a transverse furrow a little ways in front of the caudal margin, this laterally bending cephaloectad and entering a submarginal lateral furrow which on the more caudal plates is wide and deep, though only weakly developed on the anterior ones; a furrow running obliquely from each anterior corner to meet or nearly meet the longitudinal dorsal furrow of the corresponding side.

Ventral plates mostly convexly curving from ends to middle. The usual longitudinal furrow mesad of each lateral margin mostly weak; a weak median longitudinal furrow often evident, this most distinct on anterior portion of plate; the usual transverse furrow in front of caudal border more or less distinct, while on some plates a second transverse furrow farther cephalad may be seen.

Coxal pores circular or a little transversely elongate, of moderate size. Porigerous area more or less depressed and marked off by lateral elevated rims: 4, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 3.

Spines of first and second legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the fourth to seventh, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the eighth, $\frac{0,0,3,2,2}{0,0,2,3,2}$, one ventral spine of third joint very small or occasionally absent, giving formula $\frac{0,0,3,2,2}{0,0,1,3,2}$; of ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,2,1}{0,1,3,3,2}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$ or, in one specimen on one side only, observed as $\frac{1,0,3,2,0}{0,1,3,2,1}$, claws two. Last two pairs of coxae laterally armed.

The anal and penult legs are short in both male and female. In the

male the anal legs are moderately crassate, the thickening being most marked in the fourth joint which is typically wide and is deeply, longitudinally furrowed along the dorsal surface, the furrow being deepest and widest at the middle of its length; tibia also with a similar, but shallower, longitudinal furrow as also, but less distinctly, the prefemur; tarsus abruptly more slender than the tibia. Penult legs somewhat less crassate; similarly furrowed. The immediately preceding legs with prefemur and femur complanate above and with a dorsal longitudinal sulcus toward each lateral edge, a ridge-like elevation between the two; sulci most marked on femur; more anterior legs similarly but less distinctly marked. Most of the legs somewhat compressed, the joints proximad of tarsus, especially tibia and femur, more or less longitudinally furrowed along each lateral surface. In the female the legs are similar but the posterior pairs are less inflated, with the femur not conspicuously broadened, the tarsi not abruptly more slender, and the sulci less distinct. All tarsi biarticulate.

Claw of female gonopods moderately slender, thin, considerably curved; bipartite, the outer lobe usually obtusely angular and much longer than the more acute inner one. Basal spines subequal, rather slender, very acutely pointed. The statement in the original description that the claw is tripartite is a typographical error.

Length 9.5–10.5 mm. A male 10.5 mm. long has antennae cir. 5 mm. long and anal legs cir. 4 mm. long, with tenth plate 1.55 mm. wide.

Type Locality.— Tennessee: Johnson City, August 9, 1910.

Paitobius adelus, sp. nov.

Plate 5, fig. 3.

Description.— Dorsum yellowish brown to dark brown. Head distinctly darker, dusky chestnut; either the entire frontal region paler or paler only in a band along the suture. Antennae like head proximally, paler distad. Venter yellowish to light brown. Prosternum darker, somewhat chestnut-brown, the prehensors a little lighter. Legs brownish; the caudal pairs as usual, darkest, lighter mesally, ventrally, and distally than dorsally and ectally.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 52 : 46 : 50 : 59 : 57 : 55.

Head nearly equal in length and breadth or but slightly longer (53 : 52). Much narrowed cephalad. Caudal margin straight.

Antennae short, typically reaching only to the fifth segment; strongly attenuated distad. Articles twenty-seven to thirty-one, twenty-nine being the number most commonly observed. Articles distad of the second very short and closely united. Ultimate article considerably longer than the two preceding taken together.

Ocelli mostly twelve or thirteen in three, or, less commonly, in four series: *e. g.*, 1 + 4, 4, 4; 1 + 4, 4, 3; 1 + 4, 3, 3, 2.

Single ocellus usually distinctly largest, or sometimes of about same size as the most caudal one of dorsal series; others decreasing cephalad and ventrad.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.8— times greater than width at level of bottom of median incision; 3.5— times the dental line. Teeth acute, moderate in size; line of apices clearly procurved. Median incision narrowly v-shaped, the distance between apices of two mesal teeth less than that between apices of teeth of each pair.

First dorsal plate widest a little caudad of the anterior end, its sides convex and conspicuously converging to the rounded caudal corners; 1.8 times wider than long. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates produced, but the processes rather short and somewhat obtuse.

Coxal pores moderate in size, distinct, or the most proximal may be very small; typically 3, 4, 4, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,1,1}$ or $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the sixth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the seventh, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the eighth to tenth, $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{1,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{0,0,3,1,1}{0,1,2,3,2}$ or $\frac{1,0,3,1,1}{0,1,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claws two. Last two pairs, or occasionally only last pair, of coxae laterally armed.

Claw of female gonopods rather short and wide, tripartite, with all divisions acute and the median considerably broader and longer than the lateral. Spines long and slender, the outer one usually only slightly narrowed from base to the acuminate distal portion, which is apically narrowly rounded and usually has a denticle on each side at base; inner spine more uniformly acuminate from base to apex, with a denticle on outer side near middle.

Length 6.5–8 mm.

Type.— M. C. Z. No. 128, Pennsylvania: Upsal.

Also taken at Philadelphia; found in considerable numbers under fallen leaves and limbs in chestnut and oak groves. Probably a close ally of *P. exiguus* (Meinert).

Paitobius simitus (Chamberlin).

Lithobius simitus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 44.
Paitobius simitus Chamberlin, Can. ent., 1912, **44**, p. 175.

Description.— Dorsum brown. Head, first plate, and posterior plates darker, reddish brown, the head sometimes paler over frontal region.

Antennae very dark proximally, dull purplish red-brown, much lighter at tips. Prosternum dark, somewhat dusky, brown; prehensors paler, testaceous or yellow, especially ectad and distad. Anterior portion of venter light brown and suffused with purplish, becoming darker caudad, the last plates being dark brown. Legs mostly very pale brown with the tarsi clear yellow, the anterior pairs suffused with purplish, anal and penult pairs dark proximally and yellow distally, especially on mesal surface.

Body conspicuously narrowing from the eighth plate cephalad to head, the first plate narrower than the third, and the eighth and tenth of equal width. From 7.5 to 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 27 : 24 : 26 : 29 : 29.

Head suborbicular, widest back of eyes where the sides are weakly convex; from breaks caudad the sides are convex and converge considerably. Caudal margin straight or very nearly so. Head clearly longer than wide (25 : 23). Smooth and shining, not punctate.

Antennae very short, reaching only to the fifth body segment. In types composed of twenty-seven to thirty-three articles of which those distad of the second are very short and closely compacted, becoming relatively a little longer and looser distad.

Ocelli seven or eight in two series: 1 + 4, 3; 1 + 3, 3. Single ocellus somewhat paler, subcircular, not at all, or but little, enlarged. Other ocelli deeply pigmented, decreasing markedly cephalad, the most anterior one of each series being very small.

Prosternum 1.5 times wider than long. Inner dental process on each side somewhat larger than the outer as usual, and line of apices more or less procurved.

Major plates depressed within each lateral margin and across dorsum a little cephalad of caudal margin, in the latter case especially appearing as a distinct furrow. Each major plate excepting the first with a distinct longitudinal furrow each side of the middle line, the two diverging a little caudad, especially near the ends, where they often

bend ectad in the caudal transverse depression or furrow; between each of these furrows and the corresponding submarginal depression is another distinct furrow which becomes deeper and broader on the more caudal plates as do also the others. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates acutely produced.

First sternite with a median longitudinal depression. Others mostly clearly longitudinally depressed mesad of each lateral margin. A transverse furrow cephalad of caudal margin as usual, this more pronounced on the most caudal sternites.

Coxal pores small, decreasing regularly proximad on each coxa; circular and pale edged: 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,0,0}$ or $\frac{0,0,1,1,1}{0,0,0,0,1}$; of the second and third, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth to sixth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the seventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the eighth, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the ninth, $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the tenth, $\frac{0,0,3,2,2}{0,0,2,2,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0(1),2(3),3,2}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claws two. Last two pairs of coxae laterally armed, though spines of penult pair may be minute and difficult to detect.

Anal and penult legs in female short and moderately enlarged. Fourth article in anal legs somewhat flattened above and longitudinally furrowed, the third and fifth articles less distinctly sulcate.

Claw of female gonopods of moderate size, but little curved; tripartite but the most ventral lobe much the smallest and sometimes scarcely distinguishable, median much the largest, all acute. Basal spines subequal in length but the outer typically somewhat stouter than the inner, narrowing gradually from base to distal fourth or fifth of length and then more abruptly narrowing to an acute point, sometimes showing denticles at beginning of distal portion. Bristles few.

Length of type 7.7 mm.; antennae 2.5 mm. long; anal legs near 3 mm. long; tenth plate near 1 mm. wide.

Type Locality.— Mississippi: Grenada, July 15, 1910.

Paitobius watsuitus (Chamberlin).

Lithobius watsuitus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 38 (ad part. Atlanta specimen).

Description.— Dorsum light brown. Head much darker, reddish brown, or chestnut. Prosternum colored like the head but prehensors paler distad. Antennae dark brown, paler distad. Anterior plates of venter commonly tinged with purplish. Most legs light yellowish

brown but the caudal pairs darker brown, excepting the tarsi which are light.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 47 : 41 : 43 : 53 : 52.5 : 50.

Head broadly subcordate; caudal margin straight or very weakly convex; moderately narrowed and well rounded cephalad. Equal in length and breadth or slightly longer (48 : 47).

Antennae short. Articles thirty to thirty-two which, beyond the third, are short and very short and are closely united; ultimate much longer than the two preceding taken together.

Ocelli about eight in two series: *e. g.*, 1 + 4, 3.

Prosternum in type 1.5 times wider than long. Distance between chitinous spots 2.53 times width at level of bottom of mesal incision; 3.2 times the dental line. Mesal tooth on each side more elevated than the outer and the line of apices a little procurved. Mesal incision v-shaped.

First dorsal plate with sides very convex, strongly narrowed caudad; 1.8 times wider than long. Posterior angles of eleventh and thirteenth plates distinctly, though not strongly, produced, those of the thirteenth the more so.

Coxal pores very small: 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,0,0,1}$; of the second, $\frac{0,0,2,2,1}{0,0,0,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the third, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth, $\frac{0,0,2,2,1}{0,0,0,2,1}$ (right of type) or $\frac{0,0,2,2,2}{0,0,0,2,1}$, (left of type); of the fifth and sixth, $\frac{0,0,2,2,2}{0,0,0,2,1}$ (left of type) or $\frac{0,0,2,2,2}{0,0,1,2,1}$ (right of type); of the seventh, $\frac{0,0,2,2,2}{0,0,0,2,1}$ (right) or $\frac{0,0,2,2,2}{0,0,1,2,1}$ (left); of the ninth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws two or with trace of an anterior accessory claw in addition; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one.

Anal and penult legs in the male moderately crassate, especially so the fourth joint which is somewhat flattened dorso-ventrally and is longitudinally weakly furrowed in the usual way.

Length of type 7.5 mm.

Type Locality.— Georgia: Atlanta, August, 1910.

Paitobius atlantae, sp. nov.

Description.— Dorsum yellowish, with the posterior plates light orange. Head orange. Antennae orange proximally, paler distad. Prosternum orange. Venter very pale; caudal plates light orange. Legs pale like the venter, the posterior pairs correspondingly more strongly pigmented, brown of an orange tinge.

Body about 8–8.25 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36 : 34 : 36 : 43 : 43 : 40.

Head a little longer than wide (37.5 : 36). Strongly narrowed cephalad from eyes. Hairs sparse, both long and short intermixed.

Antennae short. Articles from twenty-five to twenty-seven, short and very short, submoniliform. Ultimate article long. Hairs moderate, not very dense.

Ocelli 1 + 3, the first or most caudal ocellus of the series larger than the single ocellus. Pale.

Prosternum 1.7 times wider than long. Distance between chitinous spots 2.25 times greater than width at level of bottom of median incision; four times as great as the dental line. Median incision moderately large, strictly v-shaped, acute at bottom. Teeth small, acute, equal or nearly so; line of apices straight or even slightly recurved. Tubercle of spine rather prominent; spine more slender than teeth but less bristle-like than usual, but slightly longer than the teeth.

First dorsal plate with sides moderately convex and moderately converging caudad; widest a little in front of middle; 1.8 times wider than long. Posterior angles of none of the dorsal plates produced, those of the ninth, eleventh, and thirteenth simply rounded or a little obliquely excised.

Coxal pores small, circular: 2, 2, 2, 2; 2, 2, 3, 3; 2, 3, 3, 3.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$; of the second, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 2}$; of the third to tenth, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 2}$; of the eleventh, $\frac{0, 0, 1, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 2, 1, 1}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 2, 1, 0}{0, 1, 3, 2, 0}$, claw one (two); of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one. Last pair of coxae laterally armed.

Posterior legs of male moderately and uniformly inflated. Without any special lobes. Fourth and fifth joints, more particularly, laterally, longitudinally sulcate.

Claw of female gonopods moderate in length and curvature; tripartite, the median lobe much the longest, the lateral ones subequal and at the same level, all acute. Spines 2 + 2; subequal; slender; attenuated from base distad, the sides convex and more strongly converging immediately proximad of tip; sides denticulate. Inner side of first article nearly straight.

Length 6–7 mm. A female 6.75 mm. long has antennae 2.2 mm. long and tenth plate .82 mm. wide.

TYPE.— M. C. Z., No. 130. Georgia: Atlanta.

Paitobius exceptus, sp. nov.

Description.— Dorsum pale brown, the first few and the last few plates considerably darker. Head darker brown of light chestnut cast. Antennae brown of purplish tinge proximally, pale distally. Prosternum dark brown with prehensorial feet much lighter, testaceous. Venter very pale, the anterior plates strongly suffused with violaceous, the caudal ones darker, brown. Legs like the contiguous plates of venter, the posterior pairs being brown excepting distally, where they are light in color.

Body of type about $8\frac{1}{3}$ times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 45 : 39 : 40.5 : 48 : 48 : 44.

Head in type somewhat longer than wide (47 : 45). Sides rather strongly convex and converging from lateral breaks caudad.

Antennae short as usual; articles in types, twenty-nine (or, on one side in one specimen, twenty-six).

Ocelli eleven or twelve in three or four series: *e.g.*, 1 + 4, 3, 3; 1 + 4, 4, 3; 1 + 4, 3, 3, 1. Single ocellus largest. Others regular in form and arrangement.

Prosternum in type 1.48 times wider than long. Distance between chitinous spots 2.53 times width at level of bottom of median incision; 2.9 times dental line. Median incision strictly v-shaped, sides straight. Teeth acute, of moderate size; line of apices straight. Spines slender. Lateral slopes straight, beginning at spine and extending directly ectocaudad, the anterior portion of prosternum being correspondingly narrowed.

First dorsal plate with sides convex and converging caudad from a little in front of middle; in type 1.77 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates a little produced.

Coxal pores small and round as usual: 2, 2, 3, 2; 2, 3, 3, 2.

Spines of first legs, $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,0,\,0,\,1}$ or $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,0,\,1,\,1}$; of the second, $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,0,\,2,\,1}$; of the third to sixth, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,0,\,2,\,1}$; of the seventh, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,1,\,2,\,1}$; of the eighth, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,1,\,2,\,2}$; of the ninth to eleventh, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,2,\,2}$; of the twelfth, $\frac{0,\,0,\,2,\,1,\,2}{0,\,0,\,2(3),\,3,\,2}$; of the thirteenth, $\frac{0,\,0,\,2,\,1,\,1}{0,\,1,\,2(3),\,3,\,2}$; of the penult, $\frac{1,\,0,\,2,\,1,\,1}{0,\,1,\,3,\,2,\,1}$, claws two; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,3,\,2,\,0}$, claws two, with dorsal spine of coxa sometimes doubled.

Anal and penult legs of male short; but little and uniformly thickened. Third, fourth, and fifth articles longitudinally sulcate dorsally, the fourth article most distinctly so.

Length of type (♂) 7.5 mm.

Female unknown.

Type.— M. C. Z., No. 129. Alabama: Jackson.

Paitobius zinus (Chamberlin).

Plate **5**, fig. 2.

Lithobius cantabrigensis zinus Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 41.

Description.— Testaceous to brown, with the posterior segments darker, not of reddish tinge, the anterior plates sometimes tinged with violaceous. Head dark brown, not of reddish tinge. Antennae purplish brown, pale at tips. Prosternum brown of a lighter shade than head, the prehensors paler. Venter dilute testaceous, the caudal plates darker, burnt brown. Legs nearly like corresponding plates of venter; the posterior pairs brown, somewhat paler distally.

Body moderately robust; 7.5 (Thomasville) to 8 times longer than width of tenth plate, conspicuously narrowed from eighth segment cephalad to first plate which is much narrower than the head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 25 : 23 : 24 : 28 : 27 : 26.

Head well rounded, suborbicular, from about equal in length and breadth to a little longer (51 : 49). Caudal margin mesally straight. Hairs of moderate length, sparse.

Antennae reaching sixth or seventh, or, sometimes, the beginning of the eighth segment. Articles twenty-eight to thirty-five which are mostly very short.

Ocelli eleven to sixteen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 3, 4, 3; 1 + 4, 4, 4; 1 + 4, 4, 4, 3. Single ocellus moderate, only a little largest. Ocelli of dorsal row larger than others of series as usual.

Prosternum 1.47–1.48 times wider than long in types. Distance between chitinous spots 2.56–2.7 times width at mesal incision; 3.1–3.34 times the dental line. Median incision rather narrowly v-shaped, with the sides nearly straight. Teeth of each pair well separated, the incision semicircular, the sides of teeth toward each other slanting more than the others; inner tooth larger than the outer but not borne farther forwards, so that the line of apices is a little recurved. Sides slanting directly ectocaudad from spine, and straight or nearly so.

First dorsal plate 1.78–1.8 times wider than long; sides strongly convex anteriorly, the plate being widest some distance caudad of the anterior end; sides converging strongly caudad. Caudal margin of ninth plate straight. Posterior angles of eleventh and thirteenth dorsal plates weakly produced.

Coxal pores: 2, 3, 3, 2; 3, 4, 4, 3. Small, the distal one on each coxa decidedly larger than the others which decrease proximad.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the second and third, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ (Thomasville) or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the sixth and seventh, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the eighth, $\frac{0,0,2,2,2}{0,0,2,2,2}$ (Thomasville) or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,2,2}$ to $\frac{0,0,3,2,2}{0,0,2,2,2}$ (Thomasville); of the tenth, $\frac{0,0,3,2,2}{0,0,2,2,2}$ (Thomasville) or $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ (Thomasville) or $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the twelfth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,2,3,2}$ (or $\frac{1,0,3,2,2}{0,1,3,3,2}$, Thomasville var.); of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws two, or with minute anterior one also evident; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claws two. Last one, or two (Thomasville), pairs of coxae laterally armed.

Claw of female gonopods of moderate size; but little curved; acute, with a small acute tooth toward base on ectal side and a similar one on mesal side. Spines long and slender, but slightly or not at all converging from base to the relatively very short apical portion, which occupies only a fourth or a fifth of the total length. Mesal side of first article straight or only slightly incurved.

Length 7.5 to 10 mm. A female 7.75 mm. long has antennae 3.75 mm. long; anal leg 3 mm. long; and tenth plate .98 mm. wide.

Type Locality.— North Carolina: Brown's Summit.

Taken also in Virginia at Chatham, Natural Bridge, Lynchburg, Balcony Falls. Alabama: Anniston, Thomasville (variety). Tennessee: Johnson City. Georgia: Tallapoosa.

Paitobius exiguus (Meinert).

Lithobius exiguus, Meinert, Vidensk. meddel. naturhist. foren. Kjoben, 1886, 1884–1886, p. 110. (nec Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 40; Can. ent., 1911, **43**, p. 104).

The original description is as follows: —

Brunneus, corpore subtus pedibusque pallidioribus, capite fulvo; sat gracilis, sublaevis, capite suborbiculari, fere aeque longo ac lato.

Antennae breviusculae, 31-articulatae (articulis brevissimis).

Oculi ocellis 7, in series 2 digestis.

Dentes prosternales bini.

Pori coxales 2, 3, 3, 2–3, 4, 4, 3, rotundati.

[Laminae dorsales omnes angulis rectis.]

Pedes corporis primi paris calcaribus 0, 0, 1; pedes anales calcaribus 1, 2, 1, 0–1, 3, 2, 1, [unguibus binis], armati. [Pedes penultimi paris unguibus binis armati]. [Pedum analium coxae calcare singulo, parvo armatae].

Pedes postici breviusculi, crassiusculi.

Genitalium femineorum unguis sat manifesto trilobus, aculeis tenuibus, interioribus quam exterioribus paulo tenuioribus.

Long. 6.5 mm. (fem.) — 8 mm. (mas.).

Locality.— New York City. (L. Lund).

Taiyubius Chamberlin.

Can. ent., 1912, **44**, p. 176.

Head with distinct lateral marginal interruptions.

Antennae short; articles twenty-eight to thirty-five.

Ocelli six to fourteen in three, or occasionally but two, series; single ocellus much largest.

Prosternal teeth 2 + 2 (or very rarely 3 + 3 in individual cases); line of apices recurved or, at most, straight. Spines long, distally bristle-like.

Posterior angles of the ninth, eleventh, and thirteenth dorsal plates produced.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods short; tripartite. First article with mesal side straight, not excavated mesally. Basal spines 2 + 2, or occasionally 3 + 3; conspicuously broad; usually widest at or near beginning of acuminate portion.

Tarsi of all legs divided.

Posterior legs of male without special modification.

Either none or the last one or two pairs of coxae laterally armed. Third joint of all legs, or of all but first pair, with two or three dorsal spines. Fifth joint of all legs between second to fourth and twelfth pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 1 to 0, 1, 3, 3, 0 and 0, 1, 3, 3, 1; claws two. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws 2 or 3. Dorsal spines of twelfth legs 0, 0, 3, 1, 2 or 0, 0, 3, 2, 2; ventral, 0, 0, 2, 3, 2 to 0, 0, 3, 2, 2. Dorsal spines of first legs 0, 0, 2, 2, 1 or rarely fewer; ventral 0, 0, 1, 2, 1 to 0, 0, 1, 3, 2.

Length 9 to 15 mm.

Type.— *T. angelus* Chamberlin.

This genus appears to be very close to Paitobius, the species of the two genera being much alike in habit, coloration, and general appearance. Taiyubius is to be distinguished through its having the line of apices of prosternal teeth recurved and through the broad basal spines

FIG. 5.— Distribution of Taiyubius.

of the gonopods in the females, these standing in conspicuous contrast to the slender ones uniformly present in Paitobius. Taiyubius is a prevailingly western genus, all the species occurring west of the Rockies excepting *harrielae* which is found commonly in Colorado but also in New England (Figure 5).

Key to Species of Taiyubius.

a. Each coxa of last one or two pairs of legs armed laterally with a spine.

b. Ventral spines of penult legs 1, 3, 3, 2; of the anal, 1, 3, 3, 1; articles of antennae mostly 34 or 35. *T. satanus* (Chamberlin).

bb. Ventral spines of penult legs 1, 3, 3, 1; of anal legs 1, 3, 3, 0; articles of antennae 28–32..... *T. purpureus* (Chamberlin).

aa. None of the posterior coxae laterally armed.

b. Third joint of about first nine pairs of legs with but two dorsal spines; ventral spines of second legs, 1, 3, 2; articles of antennae mostly 26 to 29..... *T. angelus* (Chamberlin).

bb. Third joint of at most first three pairs of legs with two dorsal spines; others with 3; ventral spines of second legs 1, 2, 1; articles of antennae mostly 35 to 39.
T. harrielae (Chamberlin).

TAIYUBIUS ANGELUS (Chamberlin).

Plate **5**, fig. 4, 5.

Lithobius angelus Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 155.
Taiyubius angelus Chamberlin, Can. ent., 1912, **43**, p. 176.

DESCRIPTION.— Dorsum light brown to chestnut, the most caudal plates and the head with the first plate darker. Head often paler in front of the suture. Antennae concolorous with the head, pale distad. Venter pale testaceous to brown, the caudal plates considerably darker and more reddish. Prosternum and prehensors reddish brown, the latter paler distad. Legs colored like corresponding plates of venter, the posterior pairs being thus darker, brown to chestnut, uniform or sometimes a little paler distad. The body is often suffused in deeper tissues with a violaceous pigment which is commonly most evident in venter.

Body considerably attenuated cephalad, with the tenth plate clearly wider than the eighth and than the head, and the first plate

narrower than the third. Body (in ♀) about 8 times longer than the width of the tenth plate. Width of head and of first, third, eighth, and tenth plates to each other as 40 : 36 : 37 : 42 : 45.

Head suborbicular, as long as wide or nearly so; widest at marginal breaks back of which the sides are convex and strongly converge, rounding about corners to the caudal margin which is nearly straight. Smooth and shining or under lens appearing very finely roughened over the middle portion. The usual median longitudinal sulcus beginning at a short transverse mark a little in front of the suture and extending cephalad. A wide, shallow longitudinal furrow each side of the middle running forward from the caudal margining sulcus. In some there is a more or less distinct transverse mark on each side a little ways caudad of the frontal suture. Hairs of moderate length, sparse.

Antennae short or very short, reaching only to the fifth or sixth segment. Articles twenty-six to twenty-nine, but in most twenty-eight, which, beyond the first few, are short and decrease distad. Hairs rather long, not dense.

Ocelli mostly ten or twelve in three series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 4, 3; 1 + 5, 3, 3. Single ocellus much largest, subvertically oval. Ocelli distinct and series regular; the ocelli of first and second series largest, decreasing ventrad and cephalad.

Prosternum between 1.5 and 1.6 times wider than long. Distance between chitinous spots 4 times greater than length of the dental line and 2.25 times greater than width at level of bottom of mesal incision. Teeth 2 + 2, those of each pair close together, of moderate size, the mesal tooth on each side directed somewhat mesocephalad and its apex caudad of the line tangent to apices of outer teeth.

First dorsal plate smooth and shining like the head, under the microscope appearing very finely roughened; a transverse sulcus in front of caudal border usually continuous at each end with a longitudinal furrow parallel with the margin, while another longitudinal furrow may be more or less distinguishable each side of the median line. Other major plates also with a transverse caudal furrow and a lateral longitudinal furrow on each side together with a mostly more sharply impressed longitudinal furrow farther toward the middle, this diverging from the corresponding one of the other side caudad. Plates very finely rugose, becoming more distinctly roughened caudad.

First ventral plate with a median basin-like depression, while the others show more or less distinctly the usual three longitudinal furrows, these becoming more distinct in going caudad; showing usually also two wide transverse depressions or furrows, one anterior

and one, more distinct, caudal, with sometimes finer lines and transverse rugae in the interval between the two.

Coxal pores circular or slightly transversely elliptic: 4, 4, 4, 3; 5, 5, 5, 4; 5, 5, 5, 5; 5, 5, 6, 5; etc.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,3,1}$ or $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the second, $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the third, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fourth to ninth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,1,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claws two. None of the coxae laterally armed.

Anal and penult legs short, moderately thickened, the femur and tibia weakly longitudinally sulcate above.

Gonopods of female of moderate size, but little or not at all extending beyond caudal end of the last dorsal plate. Claw tripartite, the lobes acute, with the median one but little longer than the others. Mesal edge of first joint nearly straight. Basal spines 2 + 2, conspicuously flattened above base, broad, widening distad to the beginning of the distal third of length from where narrowing to a point; edges often more or less minutely crenulate. Inner spine as usual, with broad surface set more or less at an angle with that of the outer one.

Length 13 to 15 mm. A female 13 mm. long has antennae 4.5 mm. long; anal legs 5 mm. long; width of tenth plate 1.6 mm.

Type Locality.— California: Los Angeles.

Taken also in California at Oroville and Santa Barbara.

Taiyubius satanus (Chamberlin).

Lithobius angelus satanus Chamberlin, Can. ent., 1911, **43**, p. 380.
Taiyubius satanus Chamberlin, Can. ent., 1912, **44**, p. 176.

Description.— Dorsum brown, the caudal margins of the anterior major plates darker. Head dark brown, paler in front of suture. Antennae dark brown proximally, becoming pale distad. Prosternum dark brown with the prehensorial feet paler, orange. Venter pale brown, darker caudad, the last several plates being distinctly darkest; the anterior plates suffused with violaceous. Legs similar to venter and in part showing a violaceous tint as in most species of Paitobius; posterior pairs darker excepting the last two pairs which are orange.

Body moderately attenuated cephalad; eighth and tenth plates nearly same in width, a little wider than head; first plate a little narrower than the third. Body in type (♂) not quite eight times

longer than width of tenth dorsal plate. Widths of head and of first, third, eighth, and tenth plates to each other as 34 : 31 : 32 : 36 : 36.

Head subrotund; wider than long (17 : 16). Widest near marginal interruptions, caudad of which the sides strongly converge. Caudal margin mesally incurved. Two longitudinal sulci which, beginning close together at caudal margining sulcus, diverge cephalad and end abruptly a little caudad of the frontal suture. A transverse furrow is indicated a little in front of and parallel with the suture with the usual longitudinal median sulcus extending forward from it. Finely roughened. Hairs of moderate length, sparse.

Antennae short; composed of about thirty-four or thirty-five compactly arranged articles of which the second is largest and those distad of the third short and very short. Hairs moderately long and subsparse.

Ocelli six to nine in two or three series: *e. g.*, 1 + 3, 2; 1 + 3, 3, 1; 1 + 3, 3, 2.

Prosternum between 1.6 and 1.7 times wider than long. Distance between chitinous spots three times the length of dental line and 2+ times greater than width at level of bottom of median incision. Median incision semicircular. Teeth large, acute.

Excepting the first one, the dorsal plates are rather distinctly and considerably rugose. Each major plate with a median longitudinal sulcus which is most distinct caudad; on each side a longitudinal sulcus diverges from the median one caudad, while caudad of its posterior end a shorter, sharply impressed one converges toward the corresponding one of the opposite side; farther ectad on each side a longitudinal sulcus extends parallel with margin for entire length of plate.

Ventral plates with the usual three longitudinal sulci of which the median one is usually continuous entirely across the plate and is the most distinct, especially caudad. Anterior plates usually transversely broadly depressed.

Coxal pores small, circular: 3, 3, 3, 2; 3, 3, 3, 3.

Spines of first legs, $\frac{0,\ 0,\ 1(2),\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 1,\ 1}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$; of the third, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 1,\ 1}$; of the fourth, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 1,\ 2}$ or $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 2,\ 2}$; of the fifth to ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the tenth and eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$, the anterior dorsal spine of the last two articles minute; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$ (left) or $\frac{1,\ 0,\ 3,\ 2,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$ (right); of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$, claws three; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$, claws two. Last two pairs of coxae laterally armed.

Posterior legs slender, of moderate length. In both anal and

penult pairs the prefemur, femur, and tibia are longitudinally weakly furrowed above.

Gonopods of ♂ clearly extended; narrow, distally rounded; pale.

Length near 10 mm. In the male type, which is 10 mm. long, the antennae are 3.8 mm. long, the anal legs 4.4 mm. long, and the tenth plate 1.25 mm. wide

Praematurus.— Coloration as in adult.

Antennae very short. Articles twenty-eight (left) — thirty-four (right), the two antennae differing in length correspondingly.

Ocelli 1 + 3, 2. Single ocellus largest, the most caudal one of upper series next; ocelli of lower row smallest.

Prosternal teeth 3 + 3, a small extra one being present at edge of incision on each side, the other two of usual proportions.

Coxal pores small: 3, 3, 3, 2.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 0,\ 1}$; of the second, $\frac{0,\ 0,\ 0,\ 2(1),\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the third, $\frac{0,\ 0,\ 0,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the fourth and fifth, $\frac{0,\ 0,\ 1,\ 2,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the sixth, $\frac{0,\ 0,\ 1,\ 2,\ 1(2)}{0,\ 0,\ 0,\ 2,\ 1}$; of the seventh, $\frac{0,\ 0,\ 1,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the eighth to eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 2,\ 1,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$ or $\frac{0,\ 0,\ 3,\ 1,\ 2}{0,\ 0,\ 2,\ 2,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$ or $\frac{1,\ 0,\ 3,\ 1,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$, claws three; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 0}$, claws two. Last two coxae laterally armed.

Gonopods of ♂ projecting caudad beyond sternite as a pale conical process.

Length 9 mm.

Type Locality.— California: Oakland.

Taiyubius harrielae (Chamberlin).

Plate **5**, fig. 6.

Lithobius harrielae Chamberlin, Proc. Acad. nat. sci. Phil., 1906, p. 3; Ann. Ent. soc. Amer. 1909, **2**, p. 191.

Taiyubius harrielae Chamberlin, Can. ent., 1912, **44**, p. 176.

Description.— Dorsum light brown or testaceous, with a broad median longitudinal dark stripe extending the entire length or sometimes evident only over caudal portion. Head testaceous, blackish or dusky in eye-region and sometimes in a curved band along the frontal suture. Antennae testaceous or yellowish. Prosternum and prehensors yellow or testaceous. Venter yellow, a few of the most caudal plates darker. Legs light yellow, with the caudal pairs somewhat darker, sometimes dark brown or blackish on ectal surface especially the joints proximad of tarsi.

Body moderately narrowed cephalad, the tenth plate being clearly wider than the head and slightly wider than the eighth plate. Third plate a little wider than the first. Length, in type, 7.5 times greater than width of tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 40 : 35 : 36 : 45 : 46.

Head subcordate; wider than long in ratio 17 : 16, or sometimes equal in length and breadth. Caudal margin straight or but slightly incurved. A transverse furrow more or less evident caudad of the frontal suture, the furrow or branches from it usually angularly bent caudad at the middle. The usual median longitudinal sulcus in front of the suture, this sulcus commonly double with the parts diverging cephalad. A median longitudinal furrow on caudal portion of head while from one to three curved furrows may be traced more or less clearly on each side of it.

Antennae short; composed of from thirty-three to forty-one articles of which those between the third or fourth and ultimate are short and very short and closely compacted. Hairs of moderate length, not dense.

Ocelli ten to fourteen in three series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 4, 3; 1 + 5, 4, 3. Single ocellus much the largest, vertically oval. The most caudal ocellus of top series largest of the seriate ocelli.

Prosternum 1.5, or a little more or less, times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of mesal incision; from 4 to 4.5 times the dental line. Teeth 2 + 2, small, line of apices clearly recurved. Margin ectad of teeth convexly rounding ectad and then caudad as usual.

First dorsal plate 1.8 times wider than long. Plates only very finely roughened, to the naked eye appearing nearly smooth and shining, especially so the first one. There may usually be traced on the major plates a longitudinal furrow on each side diverging from the median line caudad, with sometimes traces of a median longitudinal furrow; in some a second longitudinal furrow is evident ectad of the one first mentioned and toward which it converges caudad.

Ventral plates without conspicuous markings, to the naked eye usually appearing smooth and shining.

Coxal pores small and very small: 3, 4, 4, 3; 3, 4, 5, 3; 4, 5, 5, 3; 4, 5, 5, 4; 4, 4, 5, 4; 4, 6, 6, 5; etc.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,3,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,2,2,2}{0,0,1,3,7}$, $\frac{0,0,2,2,2}{0,0,2,3,1}$, $\frac{0,0,3,2,2}{0,0,2,3,1}$, or $\frac{0,0,3,2,2}{0,0,1,3,1}$; of the fourth and fifth, $\frac{0,0,3,2,2}{0,0,1,3,1}$ or $\frac{0,0,3,2,2}{0,0,2,3,1}$; of the sixth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,1}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,3,3,1}$, $\frac{0,0,3,2,1}{0,0,3,3,1}$ or $\frac{0,0,3,2,2}{0,0,3,3,1}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the penult,

$\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; claws two; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 0}$; claws two. None of the coxae laterally armed.

Claw of female gonopods of moderate size, rather wide, tripartite; lobes acute, the median one not much exceeding the lateral ones. Basal spines 2 + 2 or, exceptionally 3 + 3, the innermost spine on each side in the latter case being much the smallest of the three; spines very broad, widest toward middle of length, acutely pointed, shaped somewhat like a broad arrow-head.

Gonopods of male clearly exposed; subtruncate distally.

Length mostly 10 to 12 mm.

Type Locality.— Colorado: east of Glenwood Springs.

Taken also in Colorado at Salina and in Massachusetts at Cambridge and Mattapan.

Taiyubius purpureus (Chamberlin).

Lithobius purpureus Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 24.
Taiyubius purpureus Chamberlin, Can. ent., 1912, **44**, p. 176.

The original description of the types, rearranged, follows: —

Color dark purple-brown, the purple tint often conspicuous and unmixed. Head and legs yellowish brown, the tarsal joints of the last pairs of legs commonly lighter; antennae dark, yellow or rufous at ends.

Antennae composed of from twenty-eight to thirty-two, articles which, excepting the first few, are short or very short; length 2.3–3 mm.

Ocelli mostly twelve or thirteen.

Prosternal teeth normally 2 + 2, rather large and pale (rarely the teeth may be doubled).

Coxal pores small or moderate: 2, 3, 3, 2; 3, 4, 4, 3.

Ventral spines of first legs 0, 0, 0, 0, 1; of the penult, 0, 1, 3, 3, 1; of the anal, 0, 1, 3, 3, 0 (or, rarely, 0, 1, 3, 1, 0). Posterior coxae laterally armed.

Claws of female gonopods rather long, tripartite, the lobes acute, with the median longest and the outer one smallest, sometimes near base and inconspicuous. Basal spines short and broad, widest at middle.

Length 7 to 8.5 mm. Length of anal legs 3–3.3 mm.; of antennae 2.3–3 mm.

Type Locality.— Utah: Salt Lake City.

The types (U. S. N. M. 786) were found under sticks, boards, and logs laid on fine loose soil in and near growths of willows on the banks of the Jordan River.

Sonibius Chamberlin.

Can. ent., 1912, **44**, p. 176.

Head with distinct lateral marginal interruptions.

Antennae short; articles normally twenty.

Ocelli present; seriate; single ocellus enlarged.

Prosternal teeth 2 + 2 or 3 + 3; spines slender.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced.

Coxal pores circular or slightly elliptic; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods short; tripartite, with median lobe not much longest. Spines 2 + 2; short and relatively very wide.

Tarsi of anterior legs divided.

Posterior legs of male without special lobes or modifications. Third joint of all legs caudad of first or second pair with three dorsal spines or those cephalad of sixth with but two. Fifth joint of legs between third or fourth and twelfth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; claws two or three. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws two or three. Dorsal spines of twelfth legs 1, 0, 3, 1, 1 to 1, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 to 0, 0, 2, 2, 1; ventral, 0, 0, 1, 3, 1 and 0, 0, 1, 3, 2 to 0, 0, 1, 2, 1 and 0, 0, 0, 2, 1.

Last two or three pairs of coxae laterally armed.

Length 8–12.5 mm.

Type.— *S. bius* (Chamberlin).

This genus seems to be very close to Nadabius but differs from it especially in the strongly produced angles of the ninth, eleventh, and thirteenth dorsal plates and in lacking a tibial crest in the anal legs of the male. It has thus far been found only in the section of the United States east of the Mississippi River and north of the Ohio River (Figure 6).

Key to Species of Sonibius.

a. Anal legs bearing 3 distinct claws.

b. Dorsal spines of twelfth legs 1, 0, 3, 2, 2; prosternal teeth 3 + 3; length of type, ♂, 12.5 mm.) . . *S. bius* (Chamberlin).

FIG. 6.— Distribution of Sonibius.

bb. Dorsal spines of twelfth legs 1, 0, 3, 1, 1; prosternal teeth 2 + 2; length 8.5–9.5 mm. . . . . *S. parvus*, sp. nov.

aa. Anal legs bearing only 2 distinct claws.

b. Penult legs with but 1 accessory claw; ventral spines of penult legs, normally 0, 1, 3, 3, 1. . . . . *S. politus* (McNeil).

bb. Penult legs with 2 accessory claws; ventral spines of penult legs normally 0, 1, 3, 3, 2. . . . . *S. numius* (Chamberlin).

Sonibius bius (Chamberlin).

Lithobius bius Chamberlin, Can. ent., 1911, **43**, p. 102.
Sonibius bius Chamberlin, Can. ent., 1912, **44**, p. 177; 1914, **46**, p. 302.

Description.— Dorsum uniform brown. The head a little darker, with the antennae similar but becoming pale distad. Prosternum like head, the prehensors paler. Venter testaceous, the posterior plates darker. Legs light brown or testaceous dorsally, ventrally paler; caudal pairs dark proximally but distal articles yellowish or light orange.

Body rather robust, being not quite seven times as long as width of eighth and tenth plates which are equal in width. Conspicuously narrowed cephalad, with first plate narrower than the third. Widths of head and of first, third, eighth, and tenth plates to each other as 46 : 40 : 42 : 52 : 52.

Head wider than long in about ratio 23 : 21. Subrotund, the sides caudally strongly rounded. Caudal margin distinctly incurved mesally. Smooth and shining.

Antennae short, reaching fifth or sixth segment. Articles twenty (left) — twenty-three (right), moderately long, cylindric, decreasing distad. In the antenna with twenty-three articles the distal ones are proportionately shorter.

Ocelli twenty-two in five series: 1 + 5, 6, 5, 5; 1 + 5, 6, 5, 3, 2.

Prosternum 1.5+ times wider than long. Distance between chitinous spots two times, or a little more, greater than width at level of bottom of median incision; about 3.7 times the dental line. Teeth 3 + 3; acute; subequal.

Dorsal plates smooth and shining. Posterior angles of ninth, eleventh, and thirteenth acutely and strongly produced.

Ventral plates sparsely hirsute; the more caudal ones very finely roughened. Longitudinal furrows mostly obscure. A wide, shallow, transverse furrow showing in some on caudal portion.

Coxal pores small, circular: 4, 4, 5, 3; 4, 6, 5, 4.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 2}$; of the second, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 1,\ 3,\ 2}$; of the third, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the fourth to ninth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the tenth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the eleventh and twelfth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$, claws three; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 2,\ 1}$ or $\frac{1,\ 0,\ 3,\ 1,\ 0}{1,\ 0,\ 3,\ 2,\ 0}$, claws three. Last three pairs of coxae laterally armed.

Anal legs in male short, the femur very moderately thickened, complanate and longitudinally shallowly furrowed above; the tibia more slender; femur shallowly longitudinally furrowed above.

Gonopods of male but little exposed; broad and short.

Length of type (♂) 12.5 mm.

Type Locality.— Michigan: Saunders.

Taken also at Douglas Lake, Mich.

Sonibius parvus, sp. nov.

Plate 6, fig. 5.

Description.— Dorsum brown with first dorsal plate typically darker. Head darker, dusky brown, either with or without a dilute chestnut tinge. Antennae dark brown proximally, becoming orange or rufous at tips. Prosternum and prehensors testaceous. Venter light brown, the caudal plates darker. Legs of nearly same color as the corresponding ventral plates, the last pair thus darkest but tarsi of these orange or rufous.

Body proportionately broad, being usually only about 6.25 times longer than width of tenth plate. Strongly narrowed cephalad. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 49 : 44 : 48 : 58 : 60 : 60.

Head somewhat wider than long (49 : 46).

Antennae short, the articles between the first few and the ultimate very short and closely united. Ultimate longer than the two preceding together.

Ocelli twelve to seventeen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 5, 5, 4, 2; 1 + 5, 4, 3, 1. Single ocellus considerably largest. Organ of Tömösvary in usual position, of about same size in outline as the smaller ocelli.

Prosternum with incision rather large, strictly v-shaped. Teeth equal or nearly so, small. Spine of usual form and in usual position. Sides of anterior portion of prosternum straight or nearly so from spine caudoectad, not convexly rounding out as more usual in the genus;

$1\frac{2}{3}$ times wider than long. Distance between chitinous spots in type 2.6 times width at level of bottom of incision; 3.55+ times dental line.

First dorsal plate with sides moderately convex and caudally converging; 1.8 times wider than long. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly acutely produced, while in fully grown individuals the posterior angles of the seventh and also of the sixth may also be very weakly extended.

Coxal pores small: 3, 4, 4, 3; 3, 4, 4, 4.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,2,1}$ or $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,2,2,1}{0,0,1,3,1}$; of the fourth, $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,3,2}$, or $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the sixth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the seventh to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$ or $\frac{1,0,3,1,0}{0,1,3,2,0}$, the claws three. Last two pairs of coxae laterally armed.

Claw of female gonopods short; moderately curved; tripartite; median lobe somewhat longest, the lateral ones subequal and at same level or nearly so, all acute. Outer basal spine considerably larger than the inner one, broad and short, the sides subparallel from base to beginning of apical division which is very acute, denticulate on each side at base of apical portion and sometimes proximad of it. Inner spine in ventral view similar in shape but proportionately narrower (Plate **6**, fig. 5).

Length 8.5 to 9.5 mm.

Type.— M. C. Z., No. 146. Vermont: Grout's Mill, near Mt. Stratton.

Taken also in New York at Big Tupper Lake, St. Lawrence county, Thomas and F. K. Barbour.

Sonibius politus (McNeill).

Lithobius politus McNeill, Proc. U. S. N. M., 1887, **10**, p. 261. Chamberlin, Can. ent., 1911, **43**, p. 103.

Lithobius howei Bollman (ad. part max.), Proc. U. S. N. M., 1889, **11**, p. 409.

Sonibius politus Chamberlin, Can. ent., 1912, **44**, p. 177; 1920, **52**, p. 95.

Description.— Dorsum brown, uniform or nearly so. Head either nearly same as dorsum or considerably darker. Antennae brown, having often a reddish or purplish tinge proximally, paler distad; in one specimen the first article is very much lighter than those immediately succeeding. Venter testaceous, the anterior plates almost clear yellow. Prosternum testaceous, the prehensors paler.

Legs like corresponding parts of venter, caudal pairs a little darker proximally but dilute orange distally.

Body proportionately rather wide being mostly about 7 times longer than the width of the tenth plate. Body moderately narrowed cephalad and the first plate clearly narrower than the third. Widths of head and of first, third, eighth, and tenth plates to each other as 37 : 35 : 37 : 43 : 43.

Head wider than long in nearly ratio 14 : 13. Sides caudad of eyes nearly straight excepting in front of caudal corners, where more convex. Caudal margin mesally incurved. Marginal breaks not especially conspicuous. Smooth and shining.

Antennae short, reaching in most only to the fifth or to edge of sixth segment. Articles twenty, mostly short, decreasing distad gradually, or, in some, those distad of the first six to eight abruptly shorter.

Ocelli fifteen to twenty in mostly four series: *e.g.*, 1 + 2, 3, 4, 5; 1 + 5, 5, 3, 2. Single ocellus much the largest, oval.

Prosternum 1.5 times wider than long. Distance between chitinous spots 3.7 to a little less than 4 times the dental line; between 2.5 and 2.7 times width at level of bottom of mesal incision. Sides of anterior portion slanting almost directly from outer teeth. Teeth small, acute, with line of apices conspicuously reentrant; 2 + 2 or 3 + 3, in the latter case the most mesal tooth on each side commonly very small.

Dorsal plates smooth and shining. Hairs short and sparse, more numerous on caudal plates.

Ventral plates appearing smooth and shining, or under lens some are seen to be finely roughened, especially the more caudal ones. Hairs more numerous caudad.

Coxal pores of medium size, circular or slightly transversely elliptic: 4, 6, 6, 5; 4, 6, 6, 6; 5, 6, 6, 6; 4, 5, 5, 4.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,3,1}$ or $\frac{0,0,1,2,1}{0,0,1,3,2}$; of the second, $\frac{0,0,2,2,1}{0,0,1,3,1}$ or $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the third, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the fourth to tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws three, of which the anterior accessory is very small; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$ or $\frac{1,0,3,1,0}{0,1,3,2,1}$, claws two or a third represented by an obsolete point. Last two or three pairs of coxae laterally armed.

Posterior legs of male short and slender; the tibia and femur of both anal and penult pair shallowly longitudinally furrowed above.

Gonopods of male exposed as moderately large rounded or hemispherical eminences bearing two or three bristles.

Gonopods of female considerably exceeded by dorsal plate of anal segment. Claw short and relatively wide; tripartite; the lobes short and the median not much longer than the others. Basal spines short and proportionately very wide, with sides subparallel to the distal third or fourth which is acuminate with apical angle low or obtuse.

Length 8 to 11 mm.

Type Locality.— Indiana: Dublin.

Taken also in Indiana: at Bloomington, Kokomo (Bollman coll.). Michigan: Ludington. Illinois: Peoria. Ontario, Ottawa, Quebec.

Mr. Bollman appears undoubtedly to have applied his name *Lithobius howei* to two entirely different species. The type of *howei* is a male from Fort Snelling, Minn., and an examination of this shows it to be closely related to, and possibly identical with, *L. mordax* and to differ widely from the present species. In Bollman's second and somewhat fuller account of the species (Proc. U. S. N. M., 1887, **10**, p. 255 and 258) he gives the anal legs as having but one claw, with ventral spines 1, 3, 3, 1 and length 7 mm.; ventral spines of first legs 2, 3, 2; ocelli 25 in number; total length 15 mm., etc.; all of which points separate it clearly from *politus; politus* is first described in this same paper under the heading *Lithobius politus* McNeill MSS., and is reported from Dublin and Bloomington, Indiana, and from Ludington, Mich. However, in Mr. Bollman's Catalogue of the Myriopods of Indiana" (Proc. U. S. N. M., 1888, **11**) and in his posthumous Catalogue of North American Myriapoda, *politus* is not mentioned, while *howei* is listed from Dublin, Bloomington, and Kokomo. An examination of the specimens from these localities in Mr. Bollman's collection labeled as *L. howei* show them to be the same as *politus*. It is thus evident that Mr. Bollman intended to drop *politus* as a synonym of *howei;* but that the two species are widely different is evident from the original descriptions, even though the presumed type of *howei* in the National Museum, which does not agree wholly with the description, might be regarded as possibly incorrectly labeled.

Sonibius numius (Chamberlin).

Lithobius numius Chamberlin, Can. ent., 1911, **43**, p. 102.
Sonibius numius Chamberlin, Can. ent., 1912, **44**, p. 177.

Description.— Dorsum nearly uniform brown. Head darker. Antennae brown or reddish brown proximally, paler distad. Venter testaceous. Caudal legs dilute orange distad.

Body in type seven times longer than width of tenth plate; more strongly narrowed cephalad than in *politus*. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36 : 33 : 35 : 43 : 43.

Head considerably wider than long (12 : 11); broadly subcordate; caudal margin mesally distinctly incurved.

Antennae short, reaching the fifth segment. Articles of moderate length, decreasing regularly distad. Hairs of moderate length, subdense.

Ocelli twenty to twenty-three in five series: *e.g.*, 1 + 2, 5, 5, 5, 4; 1 + 3, 5, 5, 4, 2. Single ocellus oval, large.

Prosternum about 1.5 times, or a little more, wider than long. Distance between chitinous spots 2.8 times width at level of bottom of incision, a little less than 4.5 times as great as the dental line. Teeth 2 + 2, small, acute, the line of apices reentrant. Spine almost contiguous with ectal tooth, bristle-like.

Coxal pores in type: 4, 6, 6, 5.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,3,1}$ or $\frac{0,0,1,1,1}{0,0,1,3,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,3,1}$ or $\frac{0,0,3,2,1}{0,0,1,3,1}$; of the third, $\frac{0,0,3,2,1}{0,0,2,3,1}$; of the fourth, $\frac{0,0,3,2,2}{0,0,2,3,1}$; of the fifth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claws two. Last two pairs of coxae laterally armed.

Claw of female gonopods short; tripartite; lobes short with the median but little longer than the others. Spines broad; sides subparallel or a little diverging to acuminate apical portion, outer longer than inner; larger than in politus.

Length of type (♀) 10.5 mm.

Type Locality.— Wisconsin: Haugen.

Very close to the preceding species and may possibly prove to be only a variety of it.

Nadabius Chamberlin.

Bull. M. C. Z., 1913, **57**, p. 62.

Head with distinct marginal breaks.

Antennae short or very short; articles nineteen to twenty-three, but normally twenty.

Eye consisting of ocelli arranged in from three to five series; single ocellus enlarged.

Prosternal teeth 2 + 2, or occasionally 3 + 3 and 4 + 4; line of apices more or less recurved.

Posterior angles of none of the dorsal plates produced or those of eleventh and thirteenth weakly so.

Coxal pores circular; uniseriate: 3, 4, 4, 3 to 5, 6, 6, 5.

Gonopods of male uniarticulate; bearing from two to four long bristles.

Claw of female gonopods tripartite, or rarely entire by obliteration of lateral teeth. Basal spines 2 + 2, typically short and rather broad with sides proximad of apical acuminate portion subparallel or slightly diverging from base distad. First article of gonopod not excavated proximally.

Tarsi of all legs divided.

In the male the anal legs are short and but little thickened; dorsally longitudinally more or less sulcate; the fifth joint bearing a characteristic low crest at the distal end mesad of median line, the crest bearing a variable number of hairs, usually of special type.

Last one to three pairs of coxae laterally armed. Third joint of all legs caudad of second with either two or three dorsal spines, the number bearing two variable. Fifth joint of all legs between first or second and twelfth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1 to 0, 1, 3, 2, 0; claws 1 or 2. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; claws three or, less commonly, two. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 or 1, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or rarely only 1, 0, 3, 1, 1, the coxal spine sometimes missing; ventral 0, 0, 3, 3, 2 or 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 0, 0, 3, 2, 2; ventral 0, 0, 2, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of first legs 0, 0, 2, 2, 1 to 0, 0, 3, 2, 1 and 0, 0, 3, 2, 2; ventral 0, 0, 1, 2, 1 to 0, 0, 2, 3, 2.

Length 7 to 16 mm. but mostly above 10 mm.

Type.— *N. iowensis* (Meinert).

The species of Nadabius are for the greater part of medium size, prevailingly brown or chestnut in color with the head darker. In the north central states they are the most abundant in individuals of the Lithobiidae.

Key to Species of Nadabius.

a. Anal leg with 2 distinct claws.

b. Dorsal spines of thirteenth legs 1, 0, 3, 2, 2; only the last pair of coxae laterally armed.

c. Prosternal teeth 2 + 2; ventral spines of anal legs normally 0, 1, 3, 3, 0.....*N. pullus* (Bollman).

FIG. 7.— Distribution of Nadabius.

cc. Prosternal teeth 4 + 4 or sometimes 3 + 3; ventral spines of anal legs normally 0, 1, 3, 3, 1. . . *N. aristeus*, sp. nov.

bb. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1; last 2 pairs of coxae laterally armed.

c. Ventral spines of anal legs 0, 1, 3, 2, 0; dorsal spines of twelfth legs 0, 0, 3, 1, 1. . . . . *N. oreinus*, sp. nov.

cc. Ventral spines of anal legs 0, 1, 3, 3, 0 or 0, 1, 3, 3, 1; dorsal spines of twelfth legs 1, 0, 3, 1, 2 or 0, 0, 3, 1, 2.
N. coloradensis (Cockerell).

aa. Anal leg with but 1 claw.

b. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1.

c. Dorsal spines of twelfth legs 1, 0, 3, 1, 1.
N. mesechinus (Chamberlin).

cc. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 to 0, 0, 3, 2, 2 and 0, 0, 3, 1, 2.

d. Prosternal teeth 3 + 3 or 4 + 4. . . . *N. iowensis* (Meinert).

dd. Prosternal teeth 2 + 2 or rarely 2 + 3.
N. eigenmanni (Bollman).

bb. Dorsal spines of thirteenth legs, 1, 0, 3, 2, 2.
N. holzingeri (Bollman).

Nadabius aristeus, sp. nov.

Plate 6, fig. 3, 4.

Description.— Dorsum brown; a darker median longitudinal stripe more or less evident. Head and first dorsal plate much darker, almost black. Antennae very dark, brown to blackish, proximally, becoming paler and more or less rufous distally. Prosternum like head; prehensors rufous distally. Venter light brown or testaceous, darker caudally. Legs light brown, caudal pairs somewhat darker.

Body robust only 6 to 7 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other as 90 : 78 : 83 : 102 : 101 : 98.

Head subcordate, widest at level of breaks which are pronounced and rectangular. Wider than long in about ratio 15 : 14.

Antennae moderately short. Articles twenty to twenty-one; of intermediate length, subcylindric, decreasing distad. Ultimate article shorter than the two preceding taken together.

Ocelli twelve to eighteen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 4, 3, 3, 1; 1 + 4, 4, 4, 3; 1 + 4, 5, 4, 3. Single ocellus clearly

exceeding any other in size, or in largest specimens not greatly differing from most caudal ocellus of dorsal series.

Prosternal teeth 4 + 4, rarely 3 + 3, acute, the most mesal on each side smallest. Incision small, between v- and u-shaped. Spine slenderly acuminate (Plate **6**, fig. 4). In type 1.6 times wider than long. Distance between chitinous spots 2 times width at level of bottom of median incision; 2.8 times the dental line.

First dorsal plate widest anteriorly; sides convex, converging moderately caudad; 1.7— times wider than long. Posterior corners of ninth plate rectangular or a little rounded; those of the eleventh a little produced, those of the thirteenth more strongly so.

Coxal pores: 4, 5, 5, 5; circular or in part transversely subelliptic.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,2,1}$ or $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,2}$ or $\frac{0,0,2,1,1}{0,0,2,3,2}$; of the third, $\frac{0,0,2,2,2}{0,0,2,3,2}$ to $\frac{0,0,2,1,2}{0,0,1,3,2}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,3,2}$; of the sixth, $\frac{0,0,2,2,2}{0,0,1,3,2}$ or $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the seventh, $\frac{0,0,2,2,2}{0,0,2,2,2}$, $\frac{0,0,2,2,2}{0,0,2,3,2}$, or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eighth and ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh and twelfth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$ or $\frac{1,0,3,2,2}{0,1,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, or occasionally $\frac{1,0,3,1,1}{0,1,4,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$, claws two. Anal coxae laterally armed.

Tibia of anal leg in male with a sharp edged dorsal longitudinal ridge showing at its distal end the usual crest which is low and not much elevated distad.

Gonopods of male distinctly exposed; distally rounded; bearing two bristles.

Claw of female gonopods short and broad, tripartite, with the median not much larger in size than the dorsal, these two bluntly rounded and short, the ventral tooth smaller and more proximal in position. Spines proportionately very short, broad, but little narrowed from base to distal division which is short and apically rounded.

Length 11 to 16 mm. A male 11.5 mm. long has antennae 4 mm. and anal leg 4.2 mm., with tenth plate cir. 1.9 mm. wide.

Praematurus.— Coloration as in *maturus*, or a little lighter throughout.

Antennae short; articles twenty (on one side in one specimen only seventeen).

Ocelli 1 + 4, 3, 3; 1 + 4, 4, 3. Relations as in adult.

Prosternal teeth small 3 + 3. Incision widely v-shaped.

Coxal pores: 3, 4, 4, 3; very small.

Claw of female gonopods very short, thin, bilobed or trilobed with the outer lobe very small and the inner lobe blunt. Spines 2 + 2, but the inner one of each pair minute, appearing, in specimens de-

scribed, as a mere point; the outer spine already rather robust though proportionately more slender than in the adult.

Spines of first legs, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second and third, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 2,\ 2,\ 1}$; of the fourth and fifth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 1}$; of the sixth to eleventh, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$ or $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$. Last pair of coxae laterally armed.

Length 10–11 mm. (Ithaca, N. Y.).

Type.— M. C. Z., No. 247, New Jersey: Macapin, November, 1913 (J. H. Emerton).

Taken also in New York at Ithaca, and in Massachusetts at Worcester.

Nadabius pullus (Bollman).

Plate **7**, fig. 1–3.

Lithobius pullus Bollman, Amer. nat. 1887, **21**, p. 81. Proc. U. S. N. M., 1887, **10**, p. 257. 1888, **11**, p. 409. Bull. 46, U. S. N. M., 1893, p. 19, 21, 24, 110, 134. Chamberlin, Can. ent., 1911, **43**, p. 103.

Lithobius elattus Bollman, Proc. U. S. N. M., 1889, **11**, p. 348. Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 40.

Description.— Dorsum brown. Head darker, mostly somewhat chestnut. Prosternum dark brown, the prehensors lighter. Venter paler than dorsum. Legs similar to venter; posterior pairs light distally as usual.

Body in types described 7.66 to 8 times longer than width of teeth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 33 : 29 : 31 : 39 : 39 : 37.

Head precisely equal in length and breadth, or very nearly so. Lateral margin a little incurved midway between break and caudal corner, the latter widely rounded.

Antennae short or very short, commonly reaching only upon fifth body segment. Articles normally twenty, these moderately short.

Ocelli mostly near ten or eleven in three or four series: *e. g.*, 1 + 4, 3, 2; 1 + 4, 3, 3; and 1 + 4, 3, 2, 1, a common arrangement. Eye-patch subtriangular, with apex ventrad. Of the seriate ocelli the first one of the top series is largest as usual, the others not much differing in size excepting the most ventral, which may be considerably reduced.

Prosternal teeth 2 + 2, of moderate size, equal, acute. Spine long, stout at base but distally slender and acute. In type measured, prosternum is 1.52 times wider than long. Distance between chitin-

ous spots 2.2— times width at level of bottom of median incision and 3.7 times the dental line.

First dorsal plate 1.65 times wider than long. Posterior angles of none of the dorsal plates at all produced.

Coxal pores rather small, circular: 3, 4, 4, 3; 4, 5, 5, 5.

Spines of first legs, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,1,\,2,\,1}$; of the second, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,1,\,2,\,1}$ or $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,1,\,3,\,1}$; of the third to seventh, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,1,\,2,\,2}$ or $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,1,\,3,\,2}$; of the eighth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,1,\,2,\,2}$ to $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the ninth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,2,\,2}$ or $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the tenth to twelfth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the thirteenth, $^{1,\,0,\,3,\,2,\,2}_{0,\,1,\,3,\,3,\,2}$; of the penult, $^{1,\,0,\,3,\,1,\,1}_{0,\,1,\,3,\,3,\,2}$, claws two, with the accessory one large; of the anal, $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,3,\,0}$, very rarely $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,3,\,0}$, claws two. Last pair of coxae laterally armed.

Anal leg of male short, moderately thickened; fifth joint at distal end on dorsal surface and toward mesal side with a low keel-like crest which is most elevated distad; third, fourth especially, and the fifth joints longitudinally furrowed dorsally. In the female the last two pairs of legs are enlarged and furrowed as in the male but the anal pair lack the crest on fifth joint.

Gonopods of male cuneate; each bearing three long bristles.

Claw of female gonopods short and broad; distinctly tripartite, with the middle lobe longer and more acute than the lateral. Basal spines short and relatively very broad; distally acutely rounded; inner spine a little smaller than the outer, its principal plane set almost at right angles to that of the outer and its edge being thus presented ventrad.

Length 9–12 mm. a male 11.5 mm. long, has antenna 5 mm. long, anal leg 3.6 mm. long, and tenth plate 1.4+ mm. wide.

Type Locality.— Indiana: Bloomington.

Taken also in Illinois at Dwight. Tennessee: Johnson City, Russellville. Virginia: Chatham, Lynchburg, Natural Bridge, Balcony Falls, Marksville. West Virginia: White Sulphur. D. C.: Washington.

The description above is based chiefly upon a pair of the cotypes from Bloomington.

Nadabius oreinus, sp. nov.

Plate **5**, fig. 7; Plate **6**, fig. 1.

Description.— Brown. The head in front of suture paler. Antennae brown, yellow at tips. Prosternum brown, prehensors yellowish. Venter pale, of very dilute olivaceous cast, the last several plates much darker. Legs yellowish.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 65 : 59 : 60 : 70 : 72 : 69.

Head subcordate, conspicuously narrowed forward from a little behind eyes. Marginal breaks distinct but oblique. Wider than long in about ratio 65 : 60.

Antennae short. The first four or five articles rather long, the others gradually decreasing in length distad. Ultimate article longer than the two preceding together.

Ocelli in type fifteen or sixteen in three series: thus, 1 + 6, 5, 3; 1 + 6, 5, 4. Single ocellus largest, subelliptic.

Prosternum 1.62 times wider than long. Distance between chitinous spots 2.47 times width at level of bottom of sinus; $4\frac{1}{3}$ times the dental line. Sinus narrowly v-shaped. Line of apices of teeth nearly straight, the inner tooth being a little larger than the outer. Spine long and slender, bristle-like distally. Sides ectad of bristle convex.

First dorsal plate only slightly narrowed caudad, the posterior corners strongly rounded as usual; caudal margin mesally incurved; 1.68 times wider than long. Caudal margin of ninth plate straight or with ends slightly bent caudad. Posterior angles of eleventh and thirteenth dorsal plates weakly produced.

Coxal pores: 3, 4, 4, 4–4, 4, 4, 4.

Spines of first legs, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,1,\,3,\,1}$; of the second, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,1,\,3,\,2}$; of the third to eleventh, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the twelfth, $^{0,\,0,\,3,\,1,\,1}_{0,\,0,\,3,\,3,\,2}$; of the thirteenth, $^{1,\,0,\,3,\,1,\,1}_{0,\,1,\,3,\,3,\,2}$; of the penult, $^{1,\,0,\,3,\,1,\,1}_{0,\,1,\,3,\,3,\,2}$, claws three; of the anal, $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,2,\,0}$, claws two. Last two pairs of coxae laterally armed.

Claw of female gonopods short and broad; tripartite, teeth distinct and acute, sometimes a fourth tooth present on mesal side. Basal spines relatively short and very broad; in ventral view the outer one is considerably broadest, widening from base to the acutely acuminate distal portion (Plate 6, fig. 1).

Immaturus.— Very pale, the head with the antennae and several most caudal plates yellowish. Posterior legs dorsally nearly white.

Antennae already with the twenty articles present, those between the third and the ultimate relatively shorter than in the *maturus*.

Ocelli 1 + 3, 3, pale. Single ocellus a little larger than the most caudal one of upper series. Seriate ocelli conspicuously decreasing in size cephalad.

Prosternum as in adult.

Coxal pores 2, 2, 3, 2.

Gonopods of female short. The three articles developed. Claw appearing as a slender spine-like chitinous process which is entire

and slightly curved at tip. Distal article bearing a single ventral bristle, the second article two, and the first also two. Spines 1 + 1; moderately wide proximally, acuminate from near middle of length.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,2,1}$; of the second and third, $\frac{0,0,1,2,1}{0,0,0,2,1}$; of the fourth and fifth, $\frac{0,0,1,2,1}{0,0,0,2,1}$; of the sixth, $\frac{0,0,2,2,2}{0,0,0,2,1}$; of the seventh and eighth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the ninth (regenerated), $\frac{0,0,2,0,0}{0,0,1,2,1}$; of the tenth, $\frac{0,0,3,2,2}{0,0,2,2,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,1,3,3,1}$ (on one side); of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed.

Length cir. 5.5. mm.

Type.— M. C. Z., No. 271. California: Shasta Springs, August, 1909.

The male of this species is unknown.

Nadabius coloradensis (Cockerell).

Plate **7**, fig. 4.

Lithobius kochii var. *coloradensis* Cockerell, Trans. Amer. ent. soc., 1893, **20**, p. 370.
Lithobius kochii Bollman (non Stuxberg), Proc. U. S. N. M., 1889, **11**, p. 349.
Lithobius dopaintus Chamberlin, Can. ent., 1911, **43**, p. 69.
Lithobius coloradensis Chamberlin, Can. ent., 1911, **43**, p. 70.

Description.— Dorsum testaceous to brown. Head dilute chestnut, commonly darkest caudad of suture. Antennae brown proximally, becoming rufous or yellowish distad. Prosternum brown, the prehensors paler. Venter greyish yellow to dilute brown, the caudal plates somewhat more deeply pigmented as usual. Legs yellowish grey or dilute greyish brown, the posterior pairs more strongly pigmented, often light ferruginous or orange.

Body from 8.5 to 9 times longer than width of tenth plate, commonly toward the latter limit. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 33 : 31 : 33– : 39 : 36.

Head considerably wider than long (10 : 9). Sides convex between eyes and marginal breaks, behind breaks conspicuously converging caudad, weakly excurved.

Antennae short, mostly reaching to the fifth segment, more rarely to the sixth. Composed of nineteen to twenty-three articles, twenty being the usual number. Articles short, cylindric, or each only slightly enlarging distad.

Ocelli ten to fifteen in three or four series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 3, 3; 1 + 4, 4, 3; 1 + 4, 4, 3, 1; 1 + 2, 5, 3, 5; 1 + 3, 5, 3, 3; 1 + 2, 4, 3, 2.

Prosternum in measured specimen 1.64 times wider than long. Distance between chitinous spots 2.4 times the width at level of bottom of sinus; 4 times the dental line. Teeth 2 + 2, rather small, acute; line of apices recurved. Spines much stouter proximally than the bristles, abruptly and characteristically narrowed near middle, the distal portion bristle-like. Median incision widely rounded at bottom, shallow.

First dorsal plate 1.9+ times wider than long; the sides convex, considerably converging caudad; caudal corners strongly rounded. Plates polished but under lens showing a very fine tuberculation or roughening. Angles of none of the dorsal plates at all produced.

Anterior ventral plates nearly smooth, the plates caudad becoming more roughened and showing a more distinct median sulcus, this being deepest on the last two sternites.

Coxal pores of moderate size to small, circular: 3, 4, 4, 4; 3, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 4; 4, 6, 6, 5.

Spines of first legs, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,1,\,3,\,1}$ $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,1,\,3,\,2}$ or $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the second to eighth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the ninth to eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$ or $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the twelfth, $\frac{1(0),\,0,\,3,\,1,\,2}{0,\,0,\,3,\,3,\,2}$; of the thirteenth and penult, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,2}$, claws two; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,3,\,3,\,0}$ or $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,3,\,3,\,1}$, claws two. Last two pairs of coxae laterally armed.

Anal legs short and rather slender. In the male the third, fourth, and fifth articles are dorsally longitudinally furrowed; fifth article at distal end in usual place elevated into a low and rather broad crest similar to that of *iowensis* but lower and less conspicuous.

Gonopods of male very short; bearing one or two bristles, the latter being apparently the normal number.

Claw of female gonopods short and relatively wide; tripartite, the three divisions distinct and subequal or the median usually a little longer than the others. Spines short and stout, the outer somewhat larger than the inner, in ventral view with sides parallel or a little diverging to about distal third or fourth of length, then abruptly narrowing and acuminate; wider surface of inner spine more or less oblique to that of the outer one.

Length 10 to 15 mm. A male 12.5 mm. long has antennae 3.5 mm. long; anal leg 4.25 mm. long; and tenth plate 1.42 mm. wide.

Praematurus.— Color not evident in specimen described.

Antennae very short; articles twenty.

Ocelli 1 + 3, 3; 1 + 4, 2. Caudal ocellus of upper row largest.

Prosternum nearly as in *maturus*, teeth small and acute. 1.6 times wider than long.

Coxal pores very small, circular: 2, 2, 3, 3; 3, 3, 3, 3.

Claw of female gonopods short and wide, three or only two teeth evident. Basal spines 2 + 2, the inner of each pair much shorter and more slender.

Anal legs in male with fourth and fifth articles showing the longitudinal sulcation dorsally but the tibial crest only faintly or not at all indicated.

Ventral spines of first legs 0, 0, 1, 1, 1. Spines of second and third legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fourth, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the sixth and seventh, $\frac{0,0,3,2,2}{0,0,2,2,1}$; of the eighth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$. Coxae of anal legs armed laterally with a small pale spine.

Length (♂) 6.5 mm.; anal leg 2.4 mm. long; antenna 1.6 mm. long.

The *praematurus* form described is from West Cliff, Col. It is the specimen referred by Bollman to *L. kochii* Stuxberg, and is thus the type of *coloradensis*, the name having been proposed on the basis of a difference indicated by Bollman between this specimen and typical *kochii*.

Type Locality.— Colorado: West Cliff, T. D. A. Cockerell.

Taken also in Colorado at Salina and Tolland (T. D. A. Cockerell), Durango (C. F. Baker), Manitou and Colorado Springs.

Nadabius mesechinus (Chamberlin).

Plate **6**, fig. 2.

Lithobius mesechinus Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 158.

Description.— Brown. Head the same or but little darker, the anterior portion of frontal region pale. Antennae pale brown or yellowish. Prosternum like head, the prehensors lighter. Venter pale brown, the posterior plates darker. Legs pale brown or testaceous, the caudal pairs darker.

Body robust, in types from slightly less than 6 to 6.4 times longer than width of tenth plate.

Head considerably wider than long (40 : 37); widest caudally, narrowing slightly to eyes and then very strongly cephalad. Marginal breaks not conspicuous.

Antennae short as usual; composed of nineteen to twenty-one

articles of which the second is considerably longest and those distad of this short and nearly uniform, subcylindric.

Ocelli thirteen to sixteen in three series: *e.g.*, 1 + 5, 4, 3; 1 + 6, 5, 4. Single ocellus much largest. Others decreasing in size cephalad and ventrad; compactly aggregated.

Prosternum 1.7 times wider than long. Distance between chitinous spots 2.2 times width at level of bottom of sinus; 4.6 times length of the short dental line. Teeth 2 + 2; very small, acute; inner larger than the outer. Spine small extending obliquely a little mesad of directly cephalad. Sinus rather large, strictly v-shaped. Sides ectad of spines broadly and widely rounded.

First dorsal plate with sides moderately convex anteriorly and at caudal corners, but only little curved between these parts, a little converging caudad; about two times wider than long. Caudal margin of ninth plate straight or slightly extended at ends. Posterior angles of eleventh and thirteenth dorsal plates weakly produced. More caudal plates very finely roughened.

Coxal pores of medium size or large, circular or a little transversely elongate: 3, 4, 4, 3.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,1,3,2}$ or $\frac{0,0,3,2,1}{0,0,1,3,1(?)}$; of the second, $\frac{0,0,3,2,1}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the third to eighth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the ninth, $\frac{1,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the twelfth to penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, the penult with two claws; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Last two pairs of coxae laterally armed.

Claw of female gonopods short; tripartite; the lobes short, with the median one longest though not much so. Spines unusually short, wide; sides parallel from base to about middle of length at which the acutely acuminate apical division begins; inner spine somewhat smaller than the outer. Inner side of first article somewhat convex.

Length 8–10 mm. A male 10 mm. long has antennae and anal legs 3.5 mm. long and tenth plate 1.57 mm. wide.

Type Locality.— Oregon: Meacham, August, 1902.

The male of this species is not known.

Nadabius iowensis (Meinert).

Plate **7**, fig. 6; Plate **8**, fig. 1.

Lithobius iowensis Meinert, Proc. Amer. philos. soc., 1886, **23**, p. 177. Bollman, Proc. U. S. N. M., 1888, **11**, p. 409. Chamberlin, Can. ent., 1911, **43**, p. 70, 103. Gunthorp, Kans. univ. Sci. bull., 1913, **7**, p. 165.

Lithobius trilobus Bollman, Proc. U. S. N. M., 1888, **11**, p. 409 (♂♂ in part).
Lithobius bilabiatus Bollman (nec Wood), Proc. U. S. N. M., 1887, **10**, p. 256.
Lithobius sexdentatus Kenyon, Can. ent., 1893, **25**, p. 162.
Lithobius bruneri Kenyon, Can. ent., 1893, **25**, p. 162.
Nadabius iowensis Chamberlin, Bull. M. C. Z., 1913, **57**, p. 62. Can. ent., 1914, **46**, p. 302.

Description.— Light yellowish or testaceous brown to dark brown, either uniform excepting the first plate, or with the caudal plates somewhat darker, the first plate in specimens in full color frequently clearly darker than the adjacent plates, approaching the head in color and sometimes fully as dark as the latter. Head from brown through reddish brown to deep brownish black or solid black. Antennae from a lighter brown to very deep brown, tips in the latter case paler. Prosternum and prehensors deep brown. Venter yellowish to brown with the most caudal plates always conspicuously darker brown. Legs yellowish to light brown, the caudal pairs usually more or less darker.

Body varying from only 6.66 to 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth and twelfth dorsal plates to each other about as 41 : 37 : 40 : 48 : 49 : 46.

Head wider than long usually in ratio 22 : 21. Sides strongly rounded and converging from lateral breaks about corners to straight portion of caudal margin. Smooth and shining, punctae few. Hairs sparse, moderate.

Antennae very short, reaching usually only to end of fifth segment. Articles twenty to twenty-five, twenty-three being not infrequent; subcylindric or a little clavately widening; moderately short, with the second longest and the distal ones becoming very slender.

Ocelli twelve to eighteen in four or five series: *e.g.*, 1 + 4, 4, 4, 3; 1 + 4, 4, 4, 3, 1; 1 + 3, 4, 4, 3, 2; 1 + 3, 4, 4, 3, 1; 1 + 4, 4, 3, 3, 3.

Single ocellus subvertically subelliptic, rather small though clearly larger than any of the seriate ocelli which are comparatively small and closely compacted.

Prosternum between 1.45 and 1.5 times wider than long. Distance between chitinous spots 2.25— times width at level of bottom of sinus; 3.5–3.7 times the dental line. Teeth acute, well chitinized and usually dark, the innermost on each side often considerably smaller than the others; 3 + 3 or 4 + 4, very rarely only 2 + 2, and in one case observed as 6 + 4, the two extra teeth on the one side being separated by an interval from the others. Sinus wide, not acute at bottom. Spine stout at base, distally slender and usually somewhat curved mesad.

First dorsal plate 1.7— times wider than long; posterior corners well rounded, with the sides in front of them nearly straight and a little diverging cephalad to the anterior ends, in some appearing almost parallel. Plates smooth and shining or rarely obscurely somewhat rugose. Hairs becoming more numerous and somewhat longer on the more caudal plates. Posterior corners of ninth, eleventh, and thirteenth plates not at all produced, being commonly obliquely excised, with line of excision making but small angle with the horizontal.

Ventral plate clothed with rather numerous short hairs which become more dense on the caudal plates.

Coxal pores rather small, especially the most proximal ones; circular: 3, 4, 4, 3; 4, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 4.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$, $\frac{0,0,2,2,1}{0,0,1,3,1}$, $\frac{0,0,2,2,1}{0,0,1,3,2}$, $\frac{0,0,2,2,1}{0,0,2,2,1}$; or, $\frac{0,0,2,2,2}{0,0,2,3,2}$ of second to fifth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of sixth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of seventh and eighth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,3,3,2}$, being often of one formula on one side and of the other on the opposite; of the twelfth, $\frac{0,0,3,2,2}{0,0,3,3,2}$ or $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1(0),3,3,2}$, the trochanter spine being sometimes missing on one side; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$ $\frac{1,0,3,1,0}{0,1,3,2,1}$ or $\frac{1,0,3,1,0}{0,1,3,3,0}$, claw one.[1] Last three pairs of coxae laterally armed.

Anal legs short. In the female slender. In the male somewhat thicker than in the female; the third, fourth, and fifth joints dorsally longitudinally sulcate as usual, especially so the last two of these, the sulcus on the fifth joint being especially deep distad; fifth joint characterized by the usual low, flattened crest at the distal end; the crest highest distally, pilose with moderately long hairs which are curved at tips (Plate 8, fig. 1).

Gonopods of male small, distally rounded, with sides also somewhat convex and the outer longer and more oblique than the inner; distally each gonopod bearing three or four long bristles.

Claw of female gonopods of moderate size and curvature; usually strictly entire but not infrequently with a dorsal and a ventral denticle weakly indicated, the claw being evidently entire in a secondary way; acutely narrowing distad but apex usually narrowly rounded. Spines 2 + 2, or, occasionally, 3 + 3; of moderate length; when viewed at right angles to broad surface seen gradually to narrow distad with the sides slightly convex and the apex narrowly rounded; inner spine normally somewhat shorter than the outer but the difference appears

[1] A small accessory claw was observed on right leg in a male from Watersmeet, Mich., the claw of the left leg being single as usual.

exaggerated because of the insertion of the inner spine farther proximad. First joint not at all excavated on mesal side proximally.

Length 12–16 mm. A female 12 mm. long has antenna and anal leg, exclusive of coxa, 4 mm. long and tenth plate 1.75— mm. wide. A female of same length may, however, have tenth plate only 1.5 mm. wide. A male 12.5 mm. long has tenth plate 1.75 mm. wide while a second one 13.5 mm. long has this plate of same width as in preceding. (Watersmeet, Mich., chiefly).

Pseudomaturus.— Dorsum prevailingly light brown, with first plate either abruptly darker or not. Head darker brown. Antennae light brown to yellowish. Prosternum and prehensors similar to head or but little paler. Venter paler than dorsum, darker caudally as usual. Legs yellowish to light brown, the posterior pairs distally more pigmented, somewhat light ferruginous or orange.

Antennae as in *maturus.*

Ocelli: *e.g.*, 1 + 3, 3, 3, 2; 1 + 4, 3, 3, 1; 1 + 4, 3, 3, 2; 1 + 4, 4, 3, 2, 1. Thus averaging fewer than in the adult and more commonly in four series.

Prosternum with teeth 3 + 3 or 2 + 2; when 3 + 3 the innermost often much smaller and close to side of sinus.

Coxal pores very small; most frequently: 3, 4, 4, 3; also 3, 3, 3, 3 to 4, 4, 4, 3.

Claw of female gonopods smaller and more acute and paler than in adult. Spines essentially as in *maturus* but distally more acute and the inner one proportionately somewhat smaller. Bristles fewer.

Gonopods of male small and rounded; already bearing the three bristles.

Spines of first legs, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,1,\,2,\,1}$ to $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,2,\,3,\,1}$; of seventh may be, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$ or $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of anal, $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,3,\,1}$ or $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,2,\,1}$; others as in *maturus.* Last two pairs of coxae laterally armed or last three pairs as in *maturus.*

Anal legs of male modified as in the *maturus* but the crest somewhat smaller and its hairs fewer.

Length 10.5–13 mm. A female 11 mm. long has antenna 3.5 mm. and anal leg near 3 mm. long. (Mongona, Iowa).

Praematurus.— Dorsum yellowish to testaceous and brown. Head brown, always darker than dorsum of body. Antennae light brown proximally, paler distally. Prosternum and prehensors testaceous to brown, usually distinctly darker than the venter which is yellow to dilute brown, tenth caudal plates darker as usual. Legs like venter, but posterior pairs distally light, subferruginous or orange.

Antennae nearly as in older stages.

Ocelli nine to fourteen in three to five series, but mostly in three or four: *e.g.*, 1 + 3, 3, 2; 1 + 3, 3, 3; 1 + 4, 3, 3, 3; 1 + 4, 3, 3, 2, 1. All ocelli deeply pigmented.

Prosternal teeth 2 + 2, equal or very nearly so, rather pale. Sinus wide, subacute at bottom. 1.47 times wider than long. Distance between chitinous spots 2.38 times width at sinus, 3.3 times dental line.

Coxal pores very small: 2, 3, 3, 2; 3, 3, 3, 3; 3, 4, 4, 3.

Claw of female gonopods small, entire, slender and acute, pale. Spines 2 + 2, acutely acuminate, the inner much shorter and more slender than the outer. Distal article mostly with but one bristle; the second with two or three; and the first with three.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,2,1}$ or $\frac{0,0,1,2,1}{0,0,0,2,1}$; of the second and third, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,2,2,1}$; of the fourth to seventh, $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the eighth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$ or $\frac{1,0,3,1,0}{0,1,3,2,1}$. Only the last pair of coxae laterally armed.

Length 9.5–11 mm. A female 10.5 mm. long has antenna 4 mm. and anal leg 3+ mm. long and tenth plate 1.3 mm. wide. The maximum length overlaps the minimum for the *pseudomaturus*. (Mongona, Ia.)

Immaturus.— Dorsum pale brown, most plates showing three paler longitudinal lines, of violaceous tinge throughout. Head and posterior plates darker. Prosternum and prehensors similar to head. Antennae light brown, paler distally. Venter and legs pale, the posterior pairs usually more brightly pigmented.

Antennae in most composed of nineteen articles of which those distad of the third are mostly very short, though varying considerably in length, as usual in yet developing antennae.

Ocelli seven to ten in two or three series: *e.g.*, 1 + 4, 2; 1 + 3, 3; 1 + 3, 3, 2; 1 + 4, 3, 2. First ocellus of top series as large as or larger than the single ocellus.

Prosternal teeth 2 + 2, equal, pale. Sinus somewhat more acute at bottom than in *maturus*.

Coxal pores very small, the most proximal one on each coxa especially minute: 2, 2, 2, 2; 2, 3, 3, 2.

In the smaller specimens short and pale but the three articles already present; of these the distal is short and simply rounded with no indication of a claw and is glabrous; second article with one bristle and first one with one longer bristle in addition to the minute pale chitinous point representing the spine; sternite with two bristles. In larger specimens the claw is present, being small, slender, and acute;

distal article with one bristle, second mostly two and first usually four while sternite may bear as many as ten.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,0,1}$ to $\frac{0,0,1(0),2,1}{0,0,0,2,1}$; of the second, $\frac{0,0,0,2,1}{0,0,0,1,1}$ to $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third, $\frac{0,0,0,2,1}{0,0,0,1,1}$ to $\frac{0,0,2,2,2}{0,0,2,3,1}$; of the fourth and fifth, $\frac{0,0,0,2,2}{0,0,0,1,1}$ to $\frac{0,0,0,2,2}{0,0,1,2,2}$ and $\frac{0,0,0,2,2}{0,0,2,2,2}$; of the sixth, $\frac{0,0,0,2,2}{0,0,0,1,1}$ to $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the seventh to ninth, $\frac{0,0,0,2,2}{0,0,1,2,1}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{0,0,1,2,2}{0,0,1,2,1}$, $\frac{0,0,2,2,2}{0,0,1,2,1}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,1,2,1}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,2,1}$ to $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{0,0,3,1,1}{0,0,2,2,2}$ or $\frac{0,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$ to $\frac{1,0,3,1,1}{0,1,3,3,1}$. Last pair of coxae alone laterally armed.

Length 5.6–9 mm. In specimen 5.6 mm. long widths of head and of first, third, eighth, tenth and twelfth plates are to each other as 20.5 : 18.5 : 20 : 23 : 24 : 22. (Earliest stage, Watersmeet, Mich.; later, Mongona, Iowa.)

Type Locality.— Iowa: McGregor.

Found also in Iowa at McGregor (Davis), Mongona, Tama, Boone, De Witt. Nebraska: Omaha, Fremont. Kansas: Anderson, Bourbon, Coffey, Cowley, Douglas, Franklin, Graham, Jefferson, Labette, Linn, Pottawatomie, Reno, Sumner, and Trego counties (*fide* Gunthorp). Illinois: Rock Island, Franklin Grove, Sterling, Peoria, East Peoria. Indiana: Bloomington (Bollman coll.), La Fayette, Richmond, Greencastle, Salem, New Providence, Wyandotte (fide Bollman). Michigan: Watersmeet, Saunders, Menominee, Ludington. Wisconsin: Beloit, Haugen, Marinette. Colorado: Manitou (Hayden Exp. 1873, Camp). Wyoming: Cheyenne.

Variation in this species from place to place is large, the place-modes for size and other characters often differing considerably. In some places the ventral spines of the anal legs would seem to be the more frequently 1, 3, 2, 1 (some places in Illinois and Wisconsin) whereas in others the formula is almost exclusively 1, 3, 3, 1. Segregation of a distinct local variety, however, seems nowhere to have been clearly effected. Specimens cannot be referred to the different stages of postembryonal development on the basis of size because of frequent and wide overlapping. The range in size of the *immaturus*, as limited in the usual way, is very large as it is also, *e.g.*, in the spining of the legs as noted above.

An examination of specimens in several vials from Bloomington, Ind., (Coll. U. S. N. M.) labeled by Bollman as *L. trilobus* shows them for the most part to be referable to the present species, some specimens, however, are *T. pullus*. As these specimens do not very well conform to the original description, it may be supposed either that they were incorrectly referred or that there has been a transfer of

labels or an incorrect reference by number, as many of Mr. Bollman's specimens were indicated only by numbers referring to his personal catalogue.

Nadabius eigenmanni (Bollman).

Plate 7, fig. 5.

Lithobius eigenmanni Bollman, Proc. U. S. N. M., 1888, **10**, p. 625.

Description.— Dorsum testaceous to brown. Head in long preserved specimens seems also to be brown with frontal region paler, of orange tinge. Antennae yellowish, darker proximally. Prosternum like head, or a little paler. Venter pale, yellowish or testaceous, with the caudal plates more deeply pigmented as usual, brown of orange tinge. Most legs pale, the posterior pairs bright yellow or orange.

Body from 7.25 (in type specimen) to 7.75 or 8 times longer than width of tenth plate, being a robust form. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other about as 28 : 26 : 27 : 31 : 32 : 30.5 to considerably wider.

Head from equal in length and breadth; of usual general shape; caudal margin weakly and widely incurved.

Antennae short; articles short and of usual arrangement. Hairs long.

Each eye consisting of from eight to eighteen ocelli arranged in two or three to four and occasionally five series: *e.g.*, 1 + 4, 3; 1 + 4, 4, 3, 1 + 4, 3, 3; 1 + 4, 3, 1; 1 + 4, 3, 2; 1 + 4, 4, 3, 1; 1 + 4, 4, 4, 3; 1 + 3, 4, 5, 4, 1. Single ocellus often small, those of most dorsal row, or at least most caudal one, the largest of all, as well as most caudal of second row, commonly exceeding it in size; or, in largest specimens, the single ocellus is distinctly largest. Ocelli commonly not crowded, deeply pigmented, and rather irregular in form and size.

Prosternum 1.5 (type) or mostly near 1.6 times wider than long. Distance between chitinous spots 2.4, or a little less, times the width at level of bottom of sinus; 3.5 to 3.8+ times the dental line. Mesal incision of moderate width, its sides recurved. Teeth equal in size or nearly so, rather small, line of apices a little recurved. Spine not very close to tooth; much stouter at base than the bristles, narrowing rapidly distad and above level of apex of tooth slender and bristle-like.

First dorsal plate 1.8 times wider than long; sides strongly diverging cephalad. Dorsal plates rather strongly arched. Smooth. Posterior inner plates with corners obliquely truncate.

Coxal pores circular: 2, 3, 3, 2; 2, 3, 3, 3; 2, 4, 4, 3; 3, 4, 4, 3; 4, 5, 5, 5.

Spines of first legs, $\frac{0,0,1,2,1}{0,0,1,2,1}$ and $\frac{0,0,2,2,1}{0,0,1,2,1}$ (*pseudomaturus*) to $\frac{0,0,2,2,1}{0,0,2,2,1}$ and $\frac{0,0,3,2,1}{0,0,1,3,2}$ (*maturus*); of the second, $\frac{0,0,1,2,2}{0,0,1,2,1}$ and $\frac{0,0,2,2,2}{0,0,1,3,2}$ (*pseudomaturus*), to $\frac{0,0,2,2,2}{0,0,2,3,2}$ and $\frac{0,0,3,2,2}{0,0,3,2,2}$; of the third to sixth, $\frac{0,0,2,2,2}{0,0,1,3,2}$, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$ in fully grown specimens; of the seventh to eleventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,3,3,2}$, $\frac{0,0,3,1,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,3,3,2}$, the coxa rarely armed; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,0}$, with the claw single. Last two pairs of coxae laterally armed.

Anal legs in male considerably inflated, the fourth joint most noticeably so. Third, fourth, and fifth joints longitudinally furrowed above, the fourth the most distinctly so. Fourth joint on mesodorsal side toward distal end subdensely clothed with long hairs which at the tips are curved somewhat caudad; joint elsewhere only sparsely clothed with short hairs; fifth joint at distal end above with the usual crest which is low and often inconspicuous excepting in fully grown specimens. Penult legs a little less inflated; similarly sulcate; the fourth joint without the special growth of hair.

Gonopods of male with outer side more oblique than the mesal; distally transversely straight or nearly so; thin, edge-like, distad.

Claw of female gonopods short and proportionately wide; tripartite, with the median lobe little longest and the outer often somewhat smaller than the inner. Basal spines short and very broad, with sides subparallel or somewhat diverging distad to the acuminate apical portion which is rather short and acute with its sides more or less incurved; inner spine considerably and constantly smaller than the outer (Plate **7**, fig. 5). Mesal edge of first article straight, as usual in the genus.

Length from 7 to 12.5 mm. A male 9 mm. long has antennae 3.25 mm. and anal leg 3 mm. long with tenth plate 1.17 mm. wide.

Type Locality.— British Columbia: Glacier (C. H. Eigenmann).

Taken also in British Columbia at Kaslo. Oregon: Portland, August, 1902.

The description above is based in part upon the types of the species; but these are not fully developed and are in bad condition so that some features could not be made out with certainty. The main part of the account was consequently drawn from specimens collected at Portland, Oregon, and Kaslo, B. C.

The species in the region about Kaslo varies much, but intergrades seem too frequent for the separation of a distinct variety.

Nadabius holzingeri (Bollman).

Lithobius holzingeri Bollman, Entomol. Amer., 1887, **3**, p. 83. Chamberlin, Can. ent., 1911, **43**, p. 104.

Description.— Brown to chestnut, the head darker. Prosternum nearly like head, the prehensors somewhat paler. Venter paler brown, the caudal plates darker, somewhat chestnut. Legs yellowish brown or brown, the caudal pairs, as usual, clearly darker.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 44 : 44 : 45 : 52 : 54 : 52.

Head wider than long in ratio 22 : 19. Widest at marginal breaks, which are pronounced. Caudal margin straight. A transverse impression a little in front of caudal marginal thickening, the impression deepest at middle.

Antennae short. Articles twenty to twenty-three (twenty-eight *seq.* Bollman); short.

Ocelli, in types examined, sixteen or seventeen in four or five series: *e. g.*, 1 + 4, 4, 4, 3; 1 + 3, 4, 4, 4; 1 + 3, 4, 3, 3, 3. Single ocellus elliptic or oval, large.

Prosternum 1.5 or 1.6 times wider than long. Distance between chitinous spots 2.25–2.5 times the width at level of bottom of sinus; 3.4–3.5 times length of dental line.

First dorsal plate with sides rounded and diverging cephalad; 1.76 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates with a slight tendency toward production as usual.

Coxal pores circular, moderately small: 3, 4, 4, 4; 4, 5, 5, 4; 5, 6, 6, 5.

Spines of first legs, $^{0,\,0,\,2,\,2,\,1}_{0,\,0,\,2,\,3,\,2}$; of the second to fourth, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the fifth to tenth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the eleventh and twelfth, $^{0,\,0,\,3,\,2,\,2}_{0,\,0,\,3,\,3,\,2}$; of the thirteenth, $^{1,\,0,\,3,\,2,\,2}_{0,\,1,\,3,\,3,\,2}$; of the penult, $^{1,\,0,\,3,\,1,\,1}_{0,\,1,\,3,\,3,\,2}$; claws three, the two accessory claws being large and distinct; of the anal, $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,2,\,0}$, claw one, long. Last pair of coxae laterally armed.

Anal legs of male short and moderately thickened; fourth and fifth articles dorsally rather strongly longitudinally sulcate and the fifth joint having at its distal end a low, thin crest in usual position, with its dorsal line convex and highest distad. Penult legs similarly somewhat thickened and dorsally furrowed, but with no crest.

Gonopod of male subcuneate, distally subtruncate; bearing three bristles.

Claw of female gonopods short, wide, tripartite. Spines short and stout, subequal.

Length 10 to 14 mm. A male 14 mm. long has antenna 5.5 and anal leg near 4.5 mm. long.

Type Locality.— Minnesota: Winona. (J. M. Holzinger).

The description above is drawn from three of the original types (♂♂), the statement as to the female gonopods, however, being taken from the original description. Bollman gives length of males as from 16 to 21 mm., but this is much too large as is frequent with Bollman's measurements,— possibly the anal legs are included in them.

Pokabius Chamberlin.

Poabius Chamberlin (nec Koch), Ann. Ent. soc. Amer., 1912, **5**, p. 153.
Pokabius Chamberlin, Can. ent., 1912, **44**, p. 316.

Head with lateral marginal interruptions distinct (Pokabius *sens. str.;* Anobius) or sometimes scarcely evident (Lophobius).

Antennae short or very short; articles normally twenty, occasionally varying a little from this in individual cases.

Eye composed of seriate ocelli which are from six to twenty-five in number and are arranged in from two to six series. Single ocellus enlarged.

Prosternal teeth 2 + 2; line of apices more or less recurved. Spines slender, distally bristle-like.

Posterior angles of none of the dorsal plates or those of the ninth, eleventh, and thirteenth produced.

Coxal pores uniseriate, circular.

Gonopods of the male uniarticulate.

Claw of female gonopods normally tripartite, occasionally only bipartite, the median lobe commonly not much longest. Basal spines 2 + 2, usually intermediate in length and stoutness, but varying in both directions. First article of gonopods not excavated proximally.

Tarsi of all legs divided.

Anal legs of the male with fourth joint characterized by a dorsal longitudinal ridge more or less conspicuously elevated into a lobe at or near the proximal end, and the third joint with a dorsal ridge usually elevated at the distal end (Pokabius *sens. str.;* Anobius, Plate **8**, fig. 4; Plate **9**, fig. 1, 3, 4; Plate **10**, fig. 1, 3; and Plate **11**, fig. 1, 2); or in some species the ridge of fourth joint less developed and more or less elevated at distal end or in some cases practically absent (Lophobius). Penult legs never with any special lobes (excepting in *P.* (*Anobius*) *centurio*).

Fig. 8.— Distribution of Pokabius.

From one to three last pairs, or rarely none, of coxae laterally armed. Fifth joint of all legs between first and twelfth with two dorsal spines. Dorsal spines of anal legs in female varying from 1, 0, 2, 1, 0 and 1, 0, 3, 1, 0, the most common formula, to 1, 0, 4, 1, 0, and in the male from 1, 0, 2, 1, 0 to 1, 0, 6, 1, 0; ventral 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; claw one (or in *socius* only). Dorsal spines of penult legs 1, 0, 3, 1, 1 or rarely 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2 to 0, 1, 3, 3, 1 and 0, 1, 3, 3, 2; claws two or three. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 or rarely (*utahensis*) 1, 0, 2, 1, 1; ventral, 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2, rarely only 0, 0, 2, 3, 1 (*utahensis*). Dorsal spines of twelfth legs 1, 0, 3, 1, 1 or rarely 1, 0, 2, 1, 1 to 1, 0, 3, 1, 2; ventral 0, 0, 2, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of first legs, 0, 0, 2, 2, 1 to 0, 0, 3, 2, 2; ventral 0, 0, 1, 2, 1 to 0, 0, 2, 3, 2.

Length 6.5 to 17.5 mm. but mostly from 9 to 15 mm.

Type.— *P. verdescens* Chamberlin.

Variation among the species embraced in the genus as here defined is in many features large; but there seems no reason to doubt its entire naturalness excepting only the portion designated as the subgenus Lophobius. The latter may have to be withdrawn and possibly subdivided when the region over which it ranges is more thoroughly explored and the species now recognized and others yet to be found are better known in both sexes.

Pokabius is a comparatively large genus having its center in the southwest, ranging up the west coast to Washington and British Columbia and up the Mississippi valley to southern Minnesota and Wisconsin (Figure 8). In the upper Mississippi valley it is represented chiefly by *P. bilabiatus* a very abundant species. The distribution of the subgenus Lophobius is separately shown (Figure 9). The species of Lophobius are found under stones over foothills and in similar open, dryer and less wooded areas in largely semi-desert regions.

The key does not include *P. carinipes* (Daday), which is insufficiently known. (*Cf.* p. 367).

Key to Subgenera and Species of Pokabius.

a. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced..... *Anobius*, subgen. nov.[1]

b. Dorsal spines of twelfth legs 1(0), 0, 3, 1, 2; head wider than long; penult leg of ♂ with a lobe on the fourth joint; length 10 mm. or less..... *P. centurio* (Chamberlin).

[1] *P.* (*Anobius*) *centurio* (Chamberlin). Type.

bb. Dorsal spines of twelfth legs 1, 0, 3, 1, 1; head as long as wide; penult leg in ♂ with no such lobe; length 13–16 mm.
P. gilae, sp. nov.

aa. Posterior angles of none of the dorsal plates produced.

b. Anal leg of ♂ with a dorsal ridge on fourth joint elevated into a conspicuous lobe at or near the proximal end; marginal interruptions of head conspicuous..... *Pokabius sens. str.*

c. Dorsal spines of anal legs of ♂ 1, 0, 4, 1, 0 to 1, 0, 6, 1, 0; of ♀. 1, 0, 4, 1, 0.

d. Body 8.75–9.5 times longer than width of tenth plate; ventral spines of thirteenth legs usually 0, 1, 3, 3, 2.
P. bilabiatus (Wood).

dd. Body only 6.7–8 times longer than width of tenth plate; ventral spines of thirteenth legs usually 0, 0, 3, 3, 2.
P. bilabiatus verdescens Chamberlin.

cc. Dorsal spines of anal legs 1, 0, 3, 1, 0 or 1, 0, 2, 1, 0 in both ♂ and ♀.

d. None of the coxae laterally armed. Ventral spines of penult legs 0, 1, 3, 3, 1..... *P. disantus*, sp. nov.

dd. One or more pairs of posterior coxae laterally armed; ventral spines of penult legs 0, 1, 3, 3, 2.

e. Only the last pair of coxae laterally armed.

f. Distance between chitinous spots 3.5 times the dental line and near 2.33 times width at sinus; anal leg of ♂ (Plate **10**, fig. 3).... *P. utahensis* (Chamberlin).

ff. Distance between chitinous spots near 4.4 times dental line and 2.9 times width at sinus; anal leg of ♂ (Plate **11**, fig. 2)..... *P. sokovus* (Chamberlin).

ee. Last 2 or 3 pairs of coxae laterally armed.

f. Anal legs of ♂ with dorsal spines normally 1, 0, 2, 1, 0 and lobe of fourth joint at extreme proximal end (Plate **9**, fig. 1)..... *P. clavigerens* (Chamberlin).

ff. Anal leg of both ♂ and ♀ with dorsal spines 1, 0, 3, 1, 0 and lobe of fourth joint cephalad of extreme proximal end.

g. Dorsal spines of first legs normally 0, 0, 3, 2, 2; claw of ♀ gonopods subtruncate with lobes but weakly indicated; anal leg of ♂ (Plate **9**, fig. 4).
P. pitophilus (Chamberlin).

gg. Dorsal spines of first legs normally 0, 0, 2, 2, 2; claw of ♀ gonopods distally acute with 3 lobes

distinct and the median much longest; anal leg of ♂ (Plate **8**, fig. 4)..*P. iginus* (Chamberlin).

bb. Anal leg of ♂ with dorsal ridge elevated, if at all, at distal end, never with lobe at proximal end, sometimes not evident; marginal interruptions of head usually weak or scarcely manifest.....*Lophobius*, subgen. nov.

c. All of anterior legs, or all but first 1 or 2 pairs, with third joint bearing 2 ventral spines.

b. Ventral spines of penult legs 0, 1, 3, 3, 2.

c. Anal leg with 2 claws.....*P. socius* (Chamberlin).

cc. Anal leg with the claw single.

d. Dorsal spines of twelfth legs 1, 0, 3, 1, 1.

e. Ventral spines of anal legs 0, 1, 3, 2, 0; of the twelfth and thirteenth 0, 0, 3, 3, 2.
P. collium (Chamberlin).

ee. Ventral spines of anal legs 0, 1, 3, 2, 1; of twelfth and thirteenth, 0, 0, 2, 3, 2..*P. pungonius* (Chamberlin).

dd. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or 1, 0, 3, 1, 2.

e. Ventral spines of anal legs 0, 1, 3, 2, 1; head a little longer than wide.....*P. arizonae*, sp. nov.

ee. Ventral spines of anal legs normally 0, 1, 3, 2, 0; head wider than long.....*P. helenae*, sp. nov.

bb. Ventral spines of penult legs 0, 1, 3, 3, 1 (lobe at distal end of fourth joint of anal leg in ♂ strongly developed).
P. castellopes (Chamberlin).

aa. First 7 pairs of legs with the third joint bearing but a single ventral spine.....*P. eremus*, sp. nov.

Anobius, subgen. nov.

Pokabius centurio (Chamberlin).

Plate **10**, fig. 1, 2.

Lithobius centurio Chamberlin, Proc. Acad. nat. sci. Phil., 1905, **56**, p. 651.
Poabius nankus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153, pl. 12, fig. 4.

Description.— From light orange-brown to dark brown in specimens in full color; with typically a darker median longitudinal band more or less evident, and with some of the major plates in some degree darkened along caudal border. Head nearly same as dorsum or a little lighter, paler in front of suture and darkened over middle of

caudal portion. Antennae light brown. Venter a lighter brown than dorsum, the posterior sternites darkest, all excepting the latter with a paler central circular area. Anterior legs yellowish, the posterior pairs becoming brown, uniform.

Body very robust, being typically only about 5.5 times longer than width of tenth plate. Twelfth plate as wide as, or wider than, the tenth, and the tenth wider than the eighth. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 49 : 46 : 51 : 61 : 68 : 70.

Head considerably wider than long (about 10 : 9). Caudal margin widely and moderately incurved. Width not much varying in region between eyes and a level a little caudad of marginal breaks, which are weak and very oblique, the sides caudad of this region strongly converging to caudal corners. A deep and conspicuous but rather short transverse sulcus parallel with and a little in front of median portion of frontal suture. A shallow curving longitudinal furrow each side of middle in front of caudal border. Finely punctate and but slightly weakly roughened.

Antennae short; articles normally twenty but varying from nineteen to twenty-two, moderate, decreasing distad.

Ocelli fifteen to twenty-two in usually four series: *e. g.*, 1 + 5, 4, 4, 1; 1 + 5, 4, 4, 2; 1 + 5, 5, 4, 3; 1 + 6, 6, 5, 4. Ocelli closely curved and in consequence commonly hexagonal. Single ocellus large, elliptic, lying obliquely beneath and contiguous with caudal ends of series.

Prosternum about 1.6 times as wide as long. Width between chitinous spots 2.75, or somewhat more, times as great as width at level of bottom of sinus; 5.2 times as great as dental line. Teeth 2 + 2; small, acute, with apical portion sometimes extended into a bristle-like tip which is easily broken off. Spine as usual, distally bristle-like, borne on a small tubercle ectad of outer tooth, about three somewhat similar bristles ectad of the spine.

All dorsal plates finely roughened but the caudal ones more distinctly so. Most plates with a median furrow, sometimes replaced by two, and on each side one or two approximate ones diverging from it caudad. Ninth, eleventh, and thirteenth dorsal plates with the caudal angles strongly produced, but apices of processes a little rounded rather than acute. Posterior angles of seventh plate very slightly extended caudad, the mesal side of extended portion long and making but slight angle with median portion of the margin. Caudal corners of sixth plate a little obliquely excised. Lateral and caudal margins of

plates bearing numerous very short, acutely tipped, hairs upon minute serratures.

Ventral plates with two main wide transverse furrows between which there may be finer impressed lines. The last plate with two sharply impressed longitudinal sulci converging from the anterior margin and ending abruptly at about middle of the plate, where their ends are united by a less strongly impressed transverse sulcus; the preceding plate similarly but rather less conspicuously marked. Last ventral plate with adjacent coxae and succeeding segment subdensely pilose, the anterior plates being only very sparsely clothed.

Coxal pores small and circular, with those of each coxa widely separated: 2, 3, 3, 2; 3, 3, 3, 3.

Spines of the first legs, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,1,\,3,\,2}$; of the second to tenth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the twelfth, $\frac{1(0),\,0,\,3,\,1,\,2}{0,\,0,\,3,\,3,\,2}$; of the thirteenth, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,2}$; of the penult same as of thirteenth, claws three; of the anal, $\frac{1,\,0,\,2,\,1,\,0}{0,\,1,\,3,\,2,\,1}$ (♂) or $\frac{1,\,0,\,2,\,1,\,0}{0,\,1,\,3,\,2,\,1}$ (♀, also ♂), claw one. Last pair of coxae laterally armed.

Anal legs of male short and rather slender; the third joint abruptly produced at extreme distal end subdorsally into a high lobe, the caudal face of which is vertical or at right angles to axis of joint and the anterior face but little slanting, the lobe bearing two (or one) of the dorsal spines; fourth joint produced into a larger conspicuous lobe at proximal end and contiguous with the lobe of the preceding joint, the lobe somewhat plate-like, continuing caudad as a lower ridge along mesal side of dorsal surface (Plate **10**, fig. 1). In the penult legs of male the prefemur is elevated into a low, inconspicuous lobe at distal end, while the femur or fourth joint bears at its distal end a conspicuous lobe which is rather narrow from side to side; this lobe projects conspicuously dorsocaudad over plane of the articulation with tibia, both its distal and its proximal surfaces slanting in this direction but the proximal surface at an angle with the distal so that the lobe decreases distad in thickness as well as in width.

Gonopods of male small, low conical, distally rounded, pale, extended caudoectad.

Claw of female gonopods tripartite; median lobe largest though blunt and comparatively short. Spines moderate in length and stoutness, narrowing a little from base to short apical portion, with sides a little incurved; inner spine shorter and a little more slender than the outer (Plate **10**, fig. 2).

Length 13–15 mm. A male 14.25 mm. long has anal leg 5 mm. long and tenth plate 2.6 mm. wide.

Type Locality.— New Mexico: Las Vegas.

Found also in New Mexico at Las Valles (T. D. A. Cockerell), Santa Fe (H. S. Barber).

This is the only member of the genus thus far noted to have the penult, as well as the anal legs of the male pronouncedly modified.

Pokabius gilae, sp. nov.

Plate 11, fig. 1.

Description.— Dorsum light brown or testaceous, with anterior plates of more greyish cast; posterior borders of major plates in middle and anterior region with a blackish caudal border. Head somewhat ferruginous, darker caudad of suture and especially in a median blackish spot contiguous with it. Antennae brown proximally, yellow at tips. Prosternum and prehensors light testaceous. Venter dilute greyish brown. Legs dilute brown, the caudal pairs darker brown, the tarsi and mesal surface of anal pair lighter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 60 : 51 : 58 : 70 : 76 : 75.5.

Head subcordate, but with caudal margin nearly straight. Equal in length and width. Marginal breaks weak.

Antennae as usual.

Ocelli fourteen to sixteen in four series in type: 1 + 2, 5, 4, 2; 1 + 5, 5, 3, 2.

Prosternal teeth small. Median sinus small, shallow, widely v-shaped. Spine slender, straight and long. Prosternum 1.45 times wider than long. Distance between chitinous spots 2.8+ times the width at level of sinus; 4.6 times the dental line.

First dorsal plate very moderately narrowed caudad; 1.64 times wider than long. Posterior angles of eleventh and thirteenth, and of ninth on one side rather weakly produced (probably both normally produced in ninth).

Coxal pores small: 2, 2, 2, 2; 2, 3, 3, 2.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,2}$ or $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the third and fourth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fifth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claw one. Last three pairs of coxae laterally armed.

Penult legs of male without special lobes or other modifications. Anal legs of male with the third and fourth joints dorsally ridged and

produced into lobes at their contiguous ends in the general way usual in the genus, the third bearing a longitudinal dorsal ridge elevated distally into a lobe which at base is contiguous with a lobe at proximal end of a longitudinal ridge on fourth joint (Plate **11**, fig. 1).

Length between 9 and 10 mm. in type.

Type.— M. C. Z., No. 184. Arizona: Thatcher.

Known only from the male. Collected under willow leaves at edge of Gila River, April, 1913.

Pokabius bilabiatus (Wood).

Plate **8**, fig. 2.

Lithobius bilabiatus Wood, Proc. Acad. nat. sci. Phil., 1867, p. 130. Stuxberg, Ofvers. Vet.-akad. Förhandl., 1875, **32**, no. 3, p. 18, 31, 32. Chamberlin, Can. ent., 1911, **43**, p. 103.

Archilithobius bilabiatus Stuxberg, Proc. Cal. acad. sci., 1876, **7**, p. 138, 139.

Lithobius tuber Bollman, Proc. U. S. N. M., 1887, **10**, p. 256.

Lithobius malterris Kenyon, Can. ent., 1893, **25**, p. 161.

Poabius bilabiatus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153. Kan. univ. Sci. bull., 1913, **7**, p. 167.

Description.— Dorsum from light brown or testaceous to dark brown in specimens in full color, with the posterior plates usually somewhat darker than the others, while the plates generally may be paler along caudal border and in a median longitudinal line; first dorsal plate either the same as adjacent ones or it may be, in fully colored specimens, decidedly darker and not much paler than the head. Head from brown of a dilute chestnut tinge to deep brownish black. Antennae like the head or nearly so, tip rufous. Prosternum in paler specimens nearly like the head, in darker ones paler than head, dark brown but not blackish; prehensors may be a little paler than prosternum. Venter testaceous to brown of lighter shade than dorsum, caudal plates darker as usual. Legs testaceous to clear brown when in full color; posterior pairs much darker, usually much like head in color, their tarsi rufous.

Body typically long and slender being from 8.75 to 9.5 times longer than width of tenth plate from which it is only moderately narrowed cephalad. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 47 : 44 : 46 : 52 : 53 : 51.

Head considerably wider than long (*e.g.*, 47 : 43). Caudal margin widely but only weakly incurved, laterally widely curving to and

about the corners. Sides between posterior corners and marginal breaks usually substraight. On caudal portion of head a transverse semicircular impression is usually conspicuous, a distinctly impressed transverse sulcus on each side being also evident in front of caudal border. Finely and rather densely punctate.

Antennae very short, reaching only to fourth and fifth body-segments. Moderately attenuated but not very slender distally. Composed of the usual twenty, or occasionally of twenty-one or twenty-three articles, which are short but vary considerably in different specimens.

Ocelli thirteen to seventeen in four, or less commonly in three, series: *e.g.*, 1 + 5, 4, 3; 1 + 4, 5, 3, 1, a frequent arrangement; 1 + 3, 4, 3, 1; 1 + 3, 4, 4, 1; 1 + 3, 4, 3, 2; 1 + 4, 4, 3, 1; 1 + 4, 4, 3, 2; 1 + 4, 5, 4, 2; 1 + 5, 4, 3, 2; 1 + 5, 4, 4, 3. Single ocellus moderate in size. Series usually distinct and regular. Ocelli of top row not much larger, the decrease ventrad being gradual and moderate.

Prosternum between 1.57 and 1.7, times wider than long. Distance between chitinous spots in an average specimen measured 2.4 times the width at level of bottom of median sinus and 4 times the dental line. Teeth 2 + 2; line of bases forming a weakly reentrant angle and line of apices straight or nearly so, the inner tooth being usually larger; teeth acute. Spine stout proximally, slender distally and usually somewhat curved; attached a little caudad of margin.

First dorsal plate about 1.7 times wider than long; surface finely punctate and roughened. Major plates mostly showing the short transverse sulcus toward each lateral margin near caudal third and usually one or two dot-like impressions on each side farther cephalad. Under lens showing a fine roughening which is somewhat more pronounced on caudal ones. Posterior corners of all plates distinctly and more or less uniformly simply rounded.

Ventral plates with three longitudinal sulci deeply and distinctly impressed, a submedian transverse sulcus also evident on most plates. The median longitudinal sulcus less distinct on the anterior plates. On last two plates a v-shaped impression with apex caudad, this most distinct on the ultimate one, the two lateral longitudinal sulci being evident in addition, at least on the penult plate.

Coxal pores moderate, the most proximal one on each coxa often very small, all circular or subcircular: 3, 5, 4, 3; 3, 5, 5, 3; 3, 5, 5, 4; 3, 6, 4, 4; 4, 4, 5, 4; 4, 5, 5, 3; 4, 5, 5, 4; 4, 5, 6, 5; 4, 6, 6, 4; 4, 6, 6, 5; 5, 5, 5, 3; 5, 5, 5, 4; 5, 6, 6, 5.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$ to $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the second, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the third and fourth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of fifth to tenth,

$\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, those of penult less often $\frac{1,0,3,1,1}{0,0,3,3,2}$, claws three; of the anal, in the male, $\frac{1,0,6,1,0}{0,1,3,2,0}$, $\frac{1,0,5,1,0}{0,1,3,2,0}$ or rarely only $\frac{1,0,4,1,0}{0,1,3,2,0}$ but in the female nearly always, $\frac{1,0,4,1,0}{0,1,3,2,0}$, rarely $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Last three or two pairs of coxae laterally armed.

In female the posterior legs are short and slender, wholly without special lobes or furrows. In the male the third article of anal legs is produced at distal end mesad or dorsomesad into a large lobe the caudomesal side of which is convexly rounded and bears above five or six, or rarely in small specimens (*pseudomaturus*) but four, stout spines of which the most mesal is largest, and immediately ectad of these spines a subconic or rounded process which projects dorsad or dorsocaudad and bears distally a number of very short acute bristles; ectad of hinge on dorsal side a single spine in usual position. Fourth joint at a little distance caudad of its anterior end produced mesodorsad into a very large and conspicuous flattened lobe which has its anterior side nearly straight and transverse to axis of joint; caudad the lobe lowers obliquely to a low ridge which at distal end of joint is extended into a small, conical, distally strongly rounded, process bearing several aculeate hairs, this process being larger than the similar one on third joint; lobe densely clothed at its rounded apex with short aculeate bristles (*cf.* var. *rerdescens* Plate 8, fig. 3). Penult legs without lobes but the third, fourth, and fifth articles, the fourth most distinctly, dorsally longitudinally sulcate.

Gonopods of male small and wart-like; commonly distally subtruncate; bearing usually a robust bristle inserted in a distinct indentation and two smaller bristles.

Claw of female gonopods short and relatively wide; but little curved; tripartite, with the median lobe largest, acute; lateral divisions small, or very small, and tooth-like, occasionally the inner one absent and rarely the claw appearing subentire while in other cases it may show two short, blunt and nearly equal divisions. Basal spines of moderate size, with the outer considerably larger than the inner; narrowed uniformly from base distad to beginning of about distal fifth of length, where it is very obliquely truncate on exterior side, apex acute (Plate 8, fig. 2).

Length 11 to 17.5 mm. A male 17 mm. long has anal leg 4.7 mm. long; antenna 5 mm. long; and tenth plate 1.93 mm. wide. A female 15 mm. long has tenth plate 1.57 mm. wide.

Pseudomaturus.— Coloration as in *maturus* or somewhat paler in average specimens.

Antennae as in *maturus*.

Ocelli somewhat fewer and frequently in but three series: *e. g.*, 1 + 4, 4, 3.

Claw of female gonopods smaller and often with only one, the ventral, of the lateral teeth distinct. Bristles of joints somewhat fewer. Spines as in *maturus*, or the inner relatively a little smaller.

Spining of legs as in adult, but dorsal spines of anal legs in male more often only 1, 0, 4, 1, 0.

Relatively somewhat wider in proportion to length than fully matured specimens.

Length 9.5–12 mm.

Praematurus (late).— Dorsum light brown or testaceous, the posterior plates darker and sometimes verging toward chestnut. Head chestnut. Antennae at base brown or light chestnut but paler over most of length with tip lightest. Venter dilute brown, with the anterior plates somewhat darkened and the posterior ones more strongly so. Legs pale yellowish to pale greyish brown, the posterior pairs in some degree darker but pale distally. Prosternum similar to head but more dilute, the prehensors somewhat lighter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 29 : 25 : 27 : 31 : 32 : 30. Proportionately broader than in adult, sometimes being only eight times longer than width of this plate.

Antennae essentially as in adult.

Ocelli small, well separated; in number and arrangement: *e. g.*, 1 + 3, 3, 3; 1 + 5, 4, 2.

Prosternum nearly as in adult, but in the one case measured only 1.5 times wider than long with distance between chitinous spots 2.73 times width at sinus and 4.1 times dental line.

Coxal pores small: 3, 3, 3, 3; 3, 4, 4, 3; 3, 3, 4, 3.

Claw of female gonopods small, thin, and pale, acute, the exterior or ventral tooth small and the inner or dorsal one not at all or but weakly indicated. Basal spines 2 + 2, the same form as in adult or nearly so, but the inner relatively much shorter and more slender, acute.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,3,1}$; of the second to sixth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the seventh to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$ or $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,0,3,3,2}$ to $\frac{1,0,3,1,1}{0,1,2,3,2}$ or $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal (♀), $\frac{1,0,4,1,0}{0,1,3,2,0}$. Last two pairs of coxae laterally armed. (De Witt, Ia.).

Immaturus.— Dorsum pale brown, with caudal plates darker. Head brown or dilute ferruginous brown, paler in front of the suture.

Antennae pale greyish brown or yellowish, brighter distad. Prosternum yellowish brown, prehensors lighter. Venter pale, caudal plates more densely pigmented, yellowish to orange. Legs pale, brighter at tips, the posterior pairs more pigmented, brightest at tips like the others.

Body only 7.5 times longer than width of tenth plate thus still wider proportionately than in *praematurus*. Widths of head and usual series of plates to each other as 22 : 18 : 19 : 22.5 : 23 : 22.

Head relatively longer than in adult in specimens examined (♂♂) being but little wider than long.

Antennae very short with 20 articles already present, these short and very short; antennae submoniliform.

Ocelli mostly small and well separated; single ocellus relatively large; ocelli of top row largest of seriate ocelli. Ocelli in three series: *e. g.*, 1 + 4, 2, 2; 1 + 3, 4, 2.

Prosternum 1.54 times wider than long. Distance between chitinous spots 2.85 times width at sinus; 4.44 times dental line. Teeth 2 + 2, rather small, line of apices a little recurved. Spine and sinus as in *praematurus*.

Coxal pores: 2, 2, 3, 2; 2, 3, 3, 2; 2, 3, 4, 3.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,0,1}$ to $\frac{0,0,0,1,1}{0,0,0,1,1}$ and $\frac{0,0,1,1,1}{0,0,0,2,1}$; of the second, $\frac{0,0,0,2,2}{0,0,0,1,2}$, $\frac{0,0,0,2,2}{0,0,0,2,2}$ to $\frac{0,0,1,2,2}{0,0,2,2,1}$ and $\frac{0,0,1,2,2}{0,0,2,2,2}$; of the third and fourth, $\frac{0,0,1,2,2}{0,0,0,2,2}$ to $\frac{0,0,1,2,2}{0,0,2,3,2}$; of the fifth to seventh, $\frac{0,0,1,2,2}{0,0,0,2,2}$ to $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the eighth and ninth, $\frac{0,0,2,2,2}{0,0,1,2,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,2,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,3,3,2}$ or $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal (♂♂), $\frac{1,0,4,1,0}{0,1,3,2,0}$ or $\frac{1,0,3,1,0}{0,1,3,2,0}$ (observed on one side). Last pair of coxae laterally armed.

Anal legs of male with third joint but little produced mesad at distal end. Fourth joint already showing in a distinctly developed form the flattened mesodorsal process toward its proximal end, but this process relatively much shorter than in the *maturus* and the angle formed by anterior and posterior edges much more obtuse, the anterior side oblique, not nearly at right angles as in adult, and the lobe not showing the acuteate hairs; the smaller subconical processes at distal ends of third and fourth joints of adults not yet at all indicated.

Length 6.5–7.5 mm. A male 7.5 mm. long has antennae 3 mm. and anal leg 2.6 mm. long with width of tenth plate 1 mm. (DeWitt and Tama, Iowa).

Pullus IV (Larva IV).— Dorsum pale yellowish white with the head more pigmented, yellowish. Antennae and legs whitish. Prosternum and prehensors like head. Venter nearly same as dorsum of body.

Body more strongly narrowed caudad of tenth plate than in adult. Ratio of widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 32 : 26.5 : 28 : 30 : 28 : 23.

Head equal in length and breadth. Caudal margin straight or a little excurved.

Antennae composed of seventeen articles which, excepting the first three and the ultimate one, are very short; submoniliform; subsparsely hirsute.

Ocelli 1 + 2, 1. The first, or caudal, ocellus of upper series relatively very large, as large as or larger than, the single one and much larger than others of series.

Prosternum 1.54 times wider than long. Distance between chitinous spots 2.55 times width at sinus and 3.53 times dental line. Teeth 2 + 2, small, subequal with line of apices straight or slightly recurved. Spine and sinus as in older stages, or former, proportionately to teeth, somewhat stouter.

A single coxal pore present on each twelfth coxa.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,0,1}$; of the second to eighth, $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the ninth, $\frac{0,0,0,0,0}{0,0,0,0,1}$ or $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the tenth to twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$. (De Witt, Ia.).

Last three pairs of legs showing only as short pale buds in which the joints, excepting the coxa, are not as yet distinctly indicated.

Type Locality.— Illinois: Rock Island.

Found also in Illinois at Franklin Grove, Peoria, Sterling. Iowa: De Witt, Tama. Nebraska: Grand Island. Kansas: Cowley, Douglas, Graham, Sumner, and Trego counties (*fide* Gunthorp). Indiana: Bloomington (Bollman). Minnesota: Winona (Holzinger coll., seq. Bollman). Wisconsin: Devil's Lake. Mississippi: Byram.

This is apparently a very common species in the states of the northern Mississippi valley, ranging also southward toward the Gulf as indicated by its occurrence in Mississippi. It varies much in many of its features and, from material available for study, seems to have a considerable tendency toward the formation of minor forms or varieties; but intergradation is frequent and, in spite of differences in local modes, it seems inadvisable to attempt their separation as varieties, except in the case of *verdescens*, until the species is more thoroughly known and the significance of the differences indicated more clearly understood. The species offers excellent material for a careful study in variation.

Pokabius bilabiatus verdescens Chamberlin.

Plate 8, fig. 3.

Poabius verdescens Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 154, pl. 13, fig. 1.

Description.— Dorsum sometimes from clear brown to light chestnut with first plate and caudal borders of others dark but more often brown of a pronounced olivaceous cast. Head either like dorsum but usually ferruginous brown or chestnut, dusky caudad of the suture. Prosternum olivaceous to dark brown. Venter typically light to dark olivaceous though sometimes clear brown. Legs pale olivaceous to brown with posterior pairs darker as usual.

Body more robust than in *bilabiatus* proper, varying from only 6.7 to 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth and twelfth plates (in ♂) to each other as 64 : 63 : 63+ : 71 : 71 : 64.

Antennae typically somewhat longer than in *bilabiatus*, reaching seventh segment.

Ocelli as in the species.

Prosternum typically relatively narrower than in the species, being from 1.5 to 1.57 times wider than long. Distance between chitinous spots 2.5 to 2.8 times width at sinus and 4 to 4.5 times dental line. Line of apices of teeth straight or very nearly so.

Spining of legs very nearly as in *bilabiatus*, excepting that the ventral spines of the thirteenth legs, in all specimens studied, is 0, 0, 3, 3, 2, a formula sometimes present but not usual in the species.

Anal legs of male as described for *bilabiatus* proper.

Female gonopods essentially as in the species.

Length 11–18 mm.

Type Locality.— Illinois: Peoria!

Taken also in Iowa: Tama! Mongona! Boone! Mississippi: Canton!

This varietal form occurs in the same general region as the species proper. Judging from limited number of specimens of the immature stages examined, the ratio of length to width of tenth plate *increases* with development in *bilabiatus*, the slenderness becoming more and more pronounced; whereas, on the other hand, in *verdescens* it *decreases*. Study of more extensive collections may break down the seeming differences between the two forms; but if so the range of variation in the species will be found to be unusually great.

Pokabius disantus, sp. nov.

Plate **9**, fig. 3.

Lithobius clavigerens Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 373.

Description — Dorsum testaceous. Head dusky behind suture and abruptly lighter in front of it. Antennae light distad. Prosternum dusky testaceous or yellowish; prehensors yellow. Venter dilute yellow, caudal plates dusky yellow. Legs very pale, the caudal pairs more densely pigmented, bright yellow.

Body 9 to 10 times longer than width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 48 : 48 : 49 : 54 : 54 : 52.5 (♂).

Head (in ♂) slightly longer than wide (49 : 48). Weakly subsparsely punctate. Bristles moderately long, sparse.

Antennae short; articles twenty, short, subcylindric, uniform.

Ocelli ten to twelve in three series: *e.g.*, 1 + 3, 4, 3; 1 + 4, 3, 2; 1 + 4, 4, 3.

Prosternum 1.48 times wider than long. Distance between chitinous spots 2.7 times width at level of bottom of median sinus; 4.56 times the dental line. Teeth small, acute, with line of apices recurved. Spine moderately stout at base, bristle-like distally, straight.

First dorsal plate 1.7 times wider than long; sides gently convex, considerably converging caudad to and about the rounded caudal corners; widest just cephalad of middle. Caudal corners of ninth, eleventh, and thirteenth dorsal plates obliquely excised.

Coxal pores small, circular: 2, 2, 2, 2; 2, 3, 3, 2.

Spines of first legs, $\frac{0,\,0,\,1,\,2,\,2}{0,\,0,\,1,\,2,\,1}$ to $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,1,\,3,\,1}$; of the second, $\frac{0,\,0,\,1,\,2,\,2}{0,\,0,\,1,\,3,\,1}$ or $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,1,\,3,\,1}$; of the third to fifth, $\frac{0,\,0,\,1,\,2,\,2}{0,\,0,\,1,\,3,\,1}$; of the sixth, $\frac{0,\,0,\,1,\,2,\,2}{0,\,0,\,1,\,3,\,1}$ or $\frac{0,\,0,\,1,\,2,\,2}{0,\,0,\,1,\,3,\,2}$; of the seventh and eighth, $\frac{0,\,0,\,1,\,2,\,2}{0,\,0,\,1,\,3,\,2}$; of the ninth, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,1,\,3,\,2}$; of the tenth, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the eleventh, $\frac{0,\,0,\,2,\,2,\,2}{0,\,0,\,2,\,3,\,2}$ or $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the twelfth, $\frac{0,\,0,\,3,\,1,\,1}{0,\,0,\,2,\,3,\,2}$; of the thirteenth, $\frac{1,\,0,\,3,\,1,\,1}{0,\,0,\,2,\,3,\,2}$; of the penult, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,1}$, claws three; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,3,\,2,\,0}$ or, less commonly, (♂), $\frac{1,\,0,\,2,\,1,\,0}{0,\,1,\,3,\,2,\,0}$. None of the coxae armed laterally.

Anal legs of male with the third joint elevated on dorsomesal side into a conspicuous, strongly chitinized ridge which is highest a little caudad of middle of its length, its edge rounding down evenly both ways; bearing two stout dorsal spines on caudal slope of ridge one behind the other, not in a transverse line at end of joint as in *clavigerens*. Fourth article crassate, longitudinally furrowed along dorso-

mesal surface, the furrow limited on mesal side by a low ridge which is elevated at proximal end into a more transverse conspicuous lobe, thin in a nearly cephalocaudad direction but wider transversely, concave on caudal side and projecting cephalomesad; third, fourth, and fifth joints longitudinally furrowed on ectal side toward dorsal surface (Plate **9**, fig. 3).

Claw of female gonopods slightly curved; distinctly tripartite, with the median lobe much longest; the dorsal and ventral at about same level but the ventral smaller and more acute. Basal spines moderately long and slender; sides incurved between base and acuminate distal portion; a denticule at base of acuminate portion on each side with sometimes a second one farther toward apex.

Length 9–11 mm. A male 9 mm. long has antenna 3.25 mm. and anal leg 3— mm. long, with tenth plate 1 mm. wide.

Type Locality.— M. C. Z. No. 276.— California: Laurel Canyon, Los Angeles Co., June, 1909.

Found also in California at Eaton's Canyon, April, 1913.

This species much resembles *P. clavigerens* but is clearly distinct from that species in spining of legs as well as in the form of lobes of anal legs and in other features.

Pokabius utahensis (Chamberlin).

Plate **10**, fig. 3, 4.

Lithobius utahensis Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 22 (nec Ann. Ent. soc. Amer., 1909, **2**, p. 187).
Lithobius obesus Bollman (nec Stuxberg), Proc. U. S. N. M., 1888, **11**, p. 347.
Poabius utahensis Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153.

Description.— Dorsum yellow, frequently of a dilute orange tinge. Head pale orange, commonly with the frontal region somewhat paler. Antennae like the head proximally, yellow distally. Prosternum and prehensors like the head. Venter pale yellow, darker, dilute orange, caudally. Legs pale, the posterior pairs more densely pigmented as usual, bright yellow or dilute orange.

Body in females on average shorter and relatively broader than in males, being mostly from 8 to 8.5 times longer than width of tenth plate in the former, and in male often near 9.5 times longer. Widths of head and of first, third, eighth, tenth, and twelfth plates in an average individual to each other as 23 : 20 : 21 : 24 : 24.5 : 23.

Head commonly slightly longer than wide (45 : 44). Caudal margin

straight or very weakly excurved. Head in front of eyes rather broadly rounded, subsemicircular. Smooth. Hairs moderately long, sparse.

Antennae very short, reaching fourth or beginning of fifth segment. Articles twenty or sometimes twenty-one or twenty-two; mostly very short, decreasing in size from the second to the ultimate.

Ocelli five to eleven, but mostly five to eight, in two longitudinal series: *e.g.*, 1 + 1, 3; 1 + 3, 3; 1 + 2, 2; 1 + 2, 3; 1 + 5, 2; 1+ 5, 3. Ocelli often irregular in form, size and arrangement and varying considerably in size in different individuals. Single ocellus of about same size as the larger ones in series.

Prosternum 1.5 times wider than long. Distance between chitinous spots 2.33 times width at level of bottom of sinus; 3.5 times the dental line. Median sinus moderately wide, v-shaped. Teeth small and pale or scarcely darkened. Spine moderately stout at base, bristle-like distally, nearly straight.

First dorsal plate about 1.66+ times wider than long; sides cephalad of the rounded corners nearly straight and also nearly parallel. Posterior angles of none of the plates produced. Plates smooth and shining.

Coxal pores small, with the most proximal one on each coxa often minute: 2, 2, 2, 2; 2, 3, 3, 2; 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,1,\,3,\,2}$ or sometimes $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,1,\,3,\,1}$; of the second to seventh, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,1,\,3,\,2}$; of the eighth to eleventh, $^{0,\,0,\,2,\,2,\,2}_{0,\,0,\,2,\,3,\,2}$; of the twelfth, $^{1,\,0,\,2,\,1,\,1}_{0,\,0,\,2,\,3,\,2}$ or sometimes $^{1,\,0,\,3,\,1,\,1}_{0,\,0,\,2,\,3,\,2}$; of the thirteenth, $^{1,\,0,\,2,\,1,\,1}_{0,\,0,\,2,\,3,\,1}$ or, less commonly, $^{1,\,0,\,3,\,1,\,1}_{0,\,0,\,2,\,3,\,1}$; of the penult, $^{1,\,0,\,2,\,1,\,1}_{0,\,1,\,3,\,3,\,1}$ or $^{1,\,0,\,3,\,1,\,1}_{0,\,1,\,3,\,3,\,1}$, claws three; of the anal, $^{1,\,0,\,3,\,1,\,0}_{0,\,1,\,3,\,2,\,0}$ or $^{1,\,0,\,2,\,1,\,0}_{0,\,1,\,3,\,2,\,0}$, claw one. Last pair of coxae laterally armed.

Anal legs of male with the third article typically produced at distal end mesad or dorsomesad into a conspicuous lobe which is thin in cephalocaudal direction and is contiguous with a corresponding lobe at proximal end of fourth joint which bears below apex a patch of short spinules projecting caudad; third joint typically with a wide longitudinal furrow on mesal or mesodorsal surface, this limited dorsally or ectally by a longitudinal, ridge-like, elevation; the two mesal spines of dorsal surface of third joint short, distally rounded, and finely serrulate, projecting cephalad from lobe; fourth joint longitudinally furrowed along dorsomesal surface, the furrow ending anteriorly at base of lobe previously mentioned, deepest cephalad; fourth joint more or less constricted or excavated just caudad of the lobe and then thickening caudad, swollen (Plate **10**, fig. 3). The lobe formed by the extension of third and fourth joints at their con-

tiguous ends subject to considerable variation in size. Penult legs of male slightly swollen but not otherwise specially modified. In the female the posterior legs are moderately slender.

Gonopods of male pale; moderately narrowed distad with apex rounded; bearing one moderately long bristle.

Claw of female gonopods short and relatively wide, rather strongly curved; claw tripartite, all lobes distinct, the middle one a little larger than the others. Spines 2 + 2; rather robust, and typically more or less clavately widening from base to the acuminate apical portion, the outer side of which is the longer and is finely crenulate or serrulate (Plate **10**, fig. 4). Inner side of first article straight or nearly so.

Length of females 7.5–9.5 mm.; of males 8.5–10.5 mm. A male 8.5 mm. long has antennae 2.4 mm. and anal leg 2.6 mm. long; width of tenth plate .896 mm.

Pseudomaturus.— Yellow, with less of orange tinge than in *maturus*.

Ocelli averaging in number toward lesser limit given for *maturus*.

Claw of female gonopods paler and smaller with lobes more slender and acute. Spines a little less robust with inner relatively a little shorter.

Length 6.5–7.5 mm.

Praematurus.— Coloration nearly as in older stages but lighter yellow with less of orange tinge.

Widths of head and of first, third, eighth, tenth, and twelfth as 33.5 : 30 : 31 : 36 : 38 : 37.

Antennae very short; full number of articles present.

Ocelli 1 + 1, 2; 1 + 3, 2. Single ocellus variable in relative size.

Prosternum nearly as in older stages. 1.6 times wider than long. Distance between chitinous spots 2.36 times width at sinus; 3.7 times dental line.

Coxal pores: 2, 2, 2, 2; 2, 2, 3, 2; 2, 3, 3, 2.

Female gonopods with joints short, especially the second and third. Claw small, thin and pale; the three teeth evident, though slender and acute. Third joint mostly with one short bristle; second with two or three; first with four or five. Spines 2 + 2; the inner much shorter and more slender than the outer which is much as in *maturus* but smaller and often not at all clavately widened distad.

Gonopods of male small and wart-like; as yet glabrous.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,0,2,1}$ or $\frac{0,0,1,2,1}{0,0,0,2,1}$; of the second, $\frac{0,0,1,2,2}{0,0,0,2,1}$ or $\frac{0,0,1,2,1}{0,0,0,2,1}$; of the third, $\frac{0,0,1,2,2}{0,0,0,1,2}$ or $\frac{0,0,1,2,2}{0,0,0,2,2}$; of the fourth, $\frac{0,0,1,2,2}{0,0,0,2,2}$; of the fifth and sixth, $\frac{0,0,2,2,2}{0,0,0,2,2}$; of the seventh and eighth, $\frac{0,0,2,2,2}{0,0,0,2,2}$ or $\frac{0,0,2,2,2}{0,0,1,3,2}$;

of the ninth to eleventh, $^{0,0,2,2,2}_{0,0,1,3,2}$; of the twelfth, $^{1,0,2,1,1}_{0,0,2,3,2}$; of the thirteenth, $^{1,0,2,1,1}_{0,0,3,3,2}$ or $^{1,0,2,1,1}_{0,0,2,3,2}$; of the penult, $^{1,0,2,1,1}_{0,1,3,3,1}$, claws three; of the anal, $^{1,0,3,1,0}_{0,1,3,2,0}$. Last pair of coxae laterally armed.

Anal leg of male modified as in *maturus* but lobe at junction of third and fourth joints somewhat less developed with the spinules on its caudal surface fewer.

Length 5.5–6.5 mm. A female 6.5 mm. long has tenth plate .73 mm. wide, thus being nine times longer than width of this plate.

Immaturus.— Dorsum very pale, whitish, the caudal plates tinged with yellow. Head dilute orange. Prosternum and prehensors like head. Venter whitish, caudal plates tinged with yellow. Legs and antennae whitish.

Antennae already with twenty articles but, especially the median and distal ones, considerably shorter than in the *praematurus*.

Ocelli 1 + 2. The single ocellus smaller than the other two, the caudal one of which is largest. Pale.

Prosternum with teeth small and pale. Spines at base relatively to teeth somewhat stouter than in *maturus*, abruptly narrowed near middle to bristle-like form. In specimen measured only 1.45 times wider than long. Distance between chitinous spots 3 times width at sinus; 4.25 times dental line.

Coxal pores very small: 1, 2, 2, 2; 2, 2, 2, 2.

Gonopods of male small, whitish, glabrous.

Gonopods of female short and pale. Claw appearing as a small, acute pale point with no indication of lateral teeth or in earlier stages claw wholly absent. Third and second articles glabrous; the first with one or two bristles. Spines 1 + 1 or 1 + 2, small and acute, pale.

Spines of first legs, $^{0,0,0,1,1}_{0,0,0,0,1}$; of the second to fourth, $^{0,0,0,2,1}_{0,0,0,1,1}$; of the fifth, $^{0,0,0,2,1}_{0,0,0,1,1}$ or $^{0,0,0,2,2}_{0,0,0,1,1}$; of sixth to tenth, $^{0,0,1,2,2}_{0,0,0,1,1}$; or in part, especially in the more anterior ones, $^{0,0,0,2,2}_{0,0,0,1,1}$; of the eleventh, $^{0,0,1,2,2}_{0,0,0,1,1}$; of the twelfth, $^{0,0,2,1,1}_{0,0,1,2,1}$; of the thirteenth same as twelfth, or $^{1,0,2,1,1}_{0,0,2,2,1}$; of the penult, $^{1,0,2,1,1}_{0,1,3,3,1}$, $^{1,0,2,1,1}_{0,1,2,3,1}$ or $^{1,0,2,1,1}_{0,1,2,2,1}$, of the anal, $^{1,0,3,1,0}_{0,1,3,1,0}$ or $^{1,0,2,1,0}_{0,1,3,1,0}$. None of coxae as yet laterally armed.

Anal legs of male with fourth joint constricted, or excavated, near proximal end and the third and fourth joints more or less produced at junction into a lobe similar to, but usually less marked than, that in older stages, the spinules also present. Dorsal spines of third joint less modified.

Length of principal specimen described, 5.4 mm.

Agenitalis II. Whitish, of faint yellowish tinge caudad. Head dilute orange or yellowish. Antennae and legs whitish.

Antennae composed of seventeen articles which, excepting the first few and the ultimate one, are very short. Bristles proportionately long and straight, not dense.

Ocelli 1 + 1 or 1 + 2. First ocellus in series largest.

Prosternum with teeth, sinus and spines as in *immaturus* or nearly so. 1.425 times wider than long, thus narrower than in *immaturus*, the proportionate width increasing with development throughout. Distance between chitinous spots 2.66+ times width at level of bottom of median sinus; 3.42 times dental line.

Coxal pores minute: 1, 1, 1, 1.

Gonopods not yet exposed.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,0,1}$; of the second to twelfth, $\frac{0,0,0,0,0}{0,0,0,1,1}$; of the thirteenth, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the penult, $\frac{0,0,1,1,1}{0,1,1,1,1}$; of the anal, $\frac{0,0,1,0,0}{0,1,2,1,0}$ or $\frac{0,0,0,0,0}{0,1,2,1,0}$. No lateral spine on any coxae.

Anal legs already nearly as in older stages but lobes weaker.

Length 3.5–4.5 mm.

Type Locality.— Utah: Neff's Canyon, Salt Lake Co.!

Taken also in Utah in Mill Creek Canyon, City Creek Canyon, Farmington Canyon, Ogden Canyon, Cottonwood Canyon, American Fork Canyon, Provo Canyon; Spanish Fork Canyon, and other canyons of the Wahsatch Mts., where it is common under damp leaves along the streams.

Pokabius sokovus (Chamberlin).

Plate **11**, fig. 2, 3.

Lithobius sokovus Chamberlin, Ann. Ent. soc. Amer., 1909, **2**, p. 189.
Poabius sokovus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153.

Description.— Dorsum and venter very pale testaceous to whitish yellow. Head and antennae with prosternum and prehensors pale brown. Legs from whitish to pale yellow.

Body of type 8.8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 23 : 22.5 : 23 : 25 : 25 : 24.

Head well rounded behind but the caudal margin straight. A little wider than long (23 : 22.5).

Antennae short, reaching the fifth segment as usual. Articles nineteen to twenty, short, with ultimate equalling the two preceding together.

Ocelli six to eight arranged in two series: *e.g.*, 1 + 3, 2; 1 + 4, 2; 1 + 4, 3. Single ocellus small, not much differing in size from caudal ocelli of series.

Prosternum 1.55 times wider than long. Distance between chitinous spots 2.9 times width at sinus, the anterior portion of prosternum being narrow with sides strongly converging; 4.37 times the dental line. Teeth very small and pale, the inner the larger and the line of apices thereby nearly straight. Median sinus rather small, v-shaped.

First dorsal plate with sides in front of the well-rounded caudal corners nearly parallel. Posterior angles of none of the plates produced.

Coxal pores small, circular: 1, 2, 2, 2; 2, 2, 2, 2.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the second and third, $\frac{0,0,2,2,2}{0,0,1,3,1}$; of the fourth and fifth, $\frac{0,0,2,2,2}{0,0,1,3,1}$ or $\frac{0,0,2,2,2}{0,0,2,3,1}$; of the sixth, $\frac{0,0,2,2,2}{0,0,2,3,1}$; of the seventh to eleventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the penult $\frac{1,0,3,1,1}{1,1,3,3,2}$, claws two or an anterior accessory minute; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Last pair of coxae laterally armed.

Anal legs of male short and moderately inflated. Third joint elevated dorsally in a longitudinal ridge and at distal end in a transverse one much as in *utahensis;* fourth joint dorsally with a conspicuous longitudinal furrow which is widest and deepest proximally, the furrow being limited along the sides by a low ridge-like elevation and at the anterior end by the usual more conspicuously elevated lobe which extends dorsomesad and which is continuous on each side with the low longitudinal ridges, the lobe concave on its caudal surface, the concavity being a continuation of the dorsal furrow (Plate **11**, fig. 2).

Claw of female gonopods tripartite. Spines moderately long and slender, with the sides subparallel or a little incurved between base and short, acuminate, distal portion (Plate **11**, fig. 3).

Length 6.5–9 mm.

Type Locality.— Nevada: Las Vegas (1909).

Dug up in loose soil in a garden. The female is not quite fully mature.

Pokabius clavigerens Chamberlin.

Plate **9**, fig. 1, 2.

Lithobius clavigerens Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 159. Pomona coll. journ. ent., 1910, **2**, p. 373 (in part).

Lithobius manni Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 373 (*pseudomaturus* var.).

Poabius clavigerens Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153.

DESCRIPTION.— Testaceous or light brown, or rarely of greyish cast suffused with violaceous (freshly moulted specimens) to darker brown with caudal plates commonly somewhat darker, chestnut or subferruginous; posterior borders of plates often darker and also in part with an interrupted longitudinal median stripe. Head mostly of a dilute ferruginous tinge, darker caudad of suture. Antennae similar to head, but typically pale proximally and at very tips. Prosternum usually much lighter than the head. Venter pale, the more caudal plates more deeply pigmented, yellow to somewhat ferruginous. Legs pale, the caudal pairs more deeply pigmented, brown, often lighter distally and along mesal surface where color may be yellow or some shade of orange.

Body moderately robust, being typically from 7.75 to 8.5 times longer than width of tenth plate, but sometimes only 7 times longer (var. *manni*). Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 44 : 41 : 43 : 53 : 54 : 51, the first plate being clearly narrower than the third.

Head from considerably wider than long, as in the type (44 : 41) to nearly equal in length and breadth or but slightly wider (only about 29.5 : 29 in var. *manni*). Cordate, considerably narrowed caudad of breaks and strongly so in front of eyes. The most distinct sulcus is the median longitudinal one in front of the suture which unites with a transverse one parallel with and a little in front of the suture. A short oblique sulcus, not very deeply impressed, each side of the middle just back of the suture the inner end of which is near a small, pit-like impression. The usual semicircular depression on caudal portion shallow and wide. Irregularly punctate.

Antennae short, the usual twenty articles short, decreasing distad; reaching to fifth or sixth segment.

Ocelli twelve to twenty-five but mostly sixteen to twenty-five (*clavigerens, forma typica*), arranged in three or four, or, more rarely, even in five or six, series: *e.g.*, 1 + 5, 5, 3; 1 + 5, 5, 4, 2; 1 + 5, 5, 4, 1; 1 + 5, 5, 3, 2; 1 + 5, 5, 5, 2; 1 + 3, 5, 6, 3; 1 + 6, 5, 5, 1; 1 +6, 6, 6, 5, 1; 1 + 1, 5, 6, 6, 5, 1. Ocelli frequently well separated, not contiguous, regular in form and arrangement, decreasing cephalad, black. Single ocellus large.

Prosternum 1.53 to 1.58 times wider than long. Distance between chitinous spots 2.3+ to 2.55 times width at level of bottom of sinus; 4.2 to 4.4 times as long as the dental line. Sinus wide, strictly v-shaped (*manni*), or with sides concave and widely rounded at bottom (*forma typica*). Spines moderately stout at base but attenuated and

bristle-like distad, straight. Teeth small, the mesal one of each pair the larger so that line of apices is commonly almost straight.

First dorsal plate moderately narrowed caudad; about 1.85 times wider than long; sides, except at ends, nearly straight or but gently convex, moderately converging caudad. Dorsal plates mostly showing two short, deeply impressed, diverging, longitudinal lines at anterior end close to median line. Weakly roughened. Posterior corners of ninth, eleventh, and thirteenth dorsal plates mostly obliquely and somewhat concavely excised; others with corners less extensively excised or else subrectangular.

Ventral plates with each lateral longitudinal furrow on anterior portion ending abruptly in a deeper pit or bending directly ectad, especially so on the anterior plates. The median longitudinal sulcus represented on anterior plates mostly by a pit-like depression, but, more elongate on posterior plates. Last two plates of leg-bearing segments with corresponding coxae and also succeeding sternite subdensely pilose.

Coxal pores small, with the most proximal on each coxa often minute, with series sometimes irregular and even appearing double on some coxae: 3, 4, 4, 3, the most usual numbers and arrangement, to 4, 4, 4, 4 and 3, 4, 3 + 3, 3.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,1,3,2}$ to $\frac{0,0,2,2,1}{0,0,1,3,1}$; of the second and third, $\frac{0,0,3,2,2}{0,0,2,3,2}$ to $\frac{0,0,3,2,1}{0,0,1,3,1}$; of the fourth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,2,2}$ or $\frac{1,0,3,1,2}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws 3; of the anal, $\frac{1,0,2,1,0}{0,1,3,2,0}$ (male), or $\frac{1,0,3,1,0}{0,1,3,2,0}$, sometimes $\frac{1,0,3,1,0}{0,1,3,2,1}$ (var. *manni*). Last two pairs of coxae laterally armed.

Anal and penult legs short and but moderately thickened in female. In the male the fourth joint has the usual ridge-like elevation along mesodorsal surface, this increasing in height proximad and terminating in a conspicuous flattened lobe lying oblique to the rest of the ridge, with the longitudinal furrow widest and deepest just caudad of this lobe; the rounded summit of lobe densely clothed with short, straight, fine hairs (Plate **9**, fig. 1).

Claw of female gonopods moderate in size, only slightly curved; tripartite, with the lobes subacute, the middle one being but little longer than the inner or dorsal, the outer, or ventral, smallest. Spines moderately slender. Outer basal spine of each pair a little longer than the inner; in ventral view sides of spines subparallel from base to the acuminate apical portion or gently incurved between these limits; apical portion short and but moderately acute. Mesal side of first article straight and parallel with that of other gonopod or nearly so.

Length 11–16 mm. A female 15.5 mm. long has antennae 5.5 mm. and anal legs 5.25 mm. long, with tenth plate 1.97 mm. wide.

Pseudomaturus.— Coloration as in adult or but, on an average, a little paler.

Antennae same as in *maturus.*

Ocelli 1 + 5, 6, 3, 1; 1 + 5, 5, 4, 2; fourteen to eighteen in three or four series.

Claw of female gonopods a little smaller and paler but otherwise as in the *maturus.* Spines not differing but bristles somewhat fewer.

Coxal pores a little smaller relatively: 3, 4, 4, 3.

Length 9–11 mm.

Type Locality.— California: Pacific Grove.

Taken also in California at Monterey, Carmel, and Stanford.

This is a very common species in the woods near Monterey and Pacific Grove where it is found under fallen logs and the bark of the same.

Pokabius pitophilus (Chamberlin).

Plate **9**, fig. 4, 5.

Lithobius pitophilus, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 157. Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 373.

Poabius pitophilus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153.

Description.— Brown to chestnut. Head somewhat darker with frontal region paler than region caudad of suture. Antennae chestnut, rufous at tips. Prosternum brown or pale chestnut, with the prehensors lighter. Venter testaceous, the caudal plates darker as usual. Legs pale brown, the posterior pairs light distally.

Body in types 7.3–7.5 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 32 : 31 : 33 : 38 : 38 or 39 : 36.

Head considerably wider than long (8 : 7). Caudal margin widely and considerably incurved. Of about uniform width in region between breaks and eyes.

Antennae short, reaching fifth segment; articles twenty, short and approximately uniform.

Ocelli mostly twelve to twenty in four, or occasionally in three, longitudinal series: *e.g.*, 1 + 5, 4, 2; 1 + 3, 5, 3, 4; 1 + 4, 5, 5, 4; 1 + 4, 5, 4, 5; 1 + 5, 5, 5, 3. Single ocellus much largest. Other ocelli regular in form and arrangement, with the most ventral smallest as usual.

Prosternum typically about 1.48 times wider than long. Distance between chitinous spots 2.7 times width at level of bottom of median sinus; 4.4 times the dental line. Sinus widely v-shaped and rather shallow, its sides a little concave. Teeth small, the inner one on each side distinctly and considerably larger than the outer and the line of apices thus straight or sometimes even somewhat procurved. Spine small and slender.

First dorsal plate about 1.75 times wider than long; sides but moderately excurved and converging caudad. Posterior minor plates with caudal corners abruptly rounded, not excised.

Coxal pores small, circular: 3, 4, 4, 4; 4, 4, 5, 4; 4, 5, 5, 4; 4, 5, 5, 5.

Spines of first legs, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the second to ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{1,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{1,0,3,2,2}{0,0,3,3,2}$ or $\frac{1,0,3,2,2}{0,0,2,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,1}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$ or $\frac{1,0,3,1,0}{0,1,3,2,1}$, claw one.

Anal legs of male short with the fourth joint moderately inflated. This joint dorsally with the usual conspicuous, longitudinal, ridge-like elevation which is much highest at beginning of middle third of length of article where it is produced dorsad or mesodorsad into a rounded lobe between which and the anterior end the ridge is lowest; at caudal end the ridge is produced into a small, subconic process which extends dorsocaudad. Penult legs rather slender, weakly longitudinally furrowed above.

Claw of female gonopods moderately long and curved; tripartite, with the lobes rather short and often blunt, or sometimes almost obliterated and leaving the claw subentire. Spines short and relatively wide, the sides somewhat diverging from base to acuminate apical portion which is short and, especially in the outer spine, obtusely angular with outer slope much more oblique than the inner and somewhat crenulate; inner spine inserted farther dorsad so that in ventral view it is often partly covered by the outer one. Mesal sides of first article of the two gonopods moderately diverging cephalad but not at all excavated.

Gonopods of male small, sides convex and strongly converging to the short, subtruncate, distal end which bears in an indentation a very stout bristle, a second and sometimes a third smaller bristle also present.

Length 10–13 mm. A male 10.25 mm. long has anal legs 3.5 mm. long and tenth plate 1.39 mm. wide.

Type Locality.— California: Truckee (1902).

The types were taken in the pine woods about Truckee, where the species is common.

Pokabius iginus (Chamberlin).

Plate 8, fig. 4; Plate 10, fig. 5.

Poabius iginus Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 154.

Description.— Dorsum brown, the posterior plates mostly darker than the others; in some the major plates have caudal borders darkened. Head brown of dilute ferruginous cast with typically a dark, smoky, or blackish, median area between frontal suture and caudal margin. Antennae similar to head proximally, becoming paler distad, the ends being yellowish. Prosternum and prehensors similar to head but lighter. Venter yellowish to dilute brown, the last few plates much darkest. Legs nearly like corresponding plates of venter or a little paler; the caudal pairs lightest distally as usual.

Typical full grown males average near 7 times longer than width of tenth plate but younger males and females are more slender, being as much as 8.4 times as long as the tenth plate. Widths of head and of first, third, eighth, tenth and twelfth plates to each other about as 39 : 39 : 41 : 45 : 45 : 43.5.

Head only slightly wider than long (39 : 38). Portion back of eyes subquadrate, the sides between eyes and lateral breaks nearly straight and parallel, from breaks rounding about corners caudad as usual. Caudal margin straight. A transverse sulcus in front of caudal margin which is united or continuous with two straight longitudinal sulci moderately diverging from it cephalad. Hairs short and sparse.

Antennae very short, reaching only to the fifth segment, attenuated distad in the usual degree. Articles twenty; sides of each article straight, but little diverging distad.

Ocelli twelve to fifteen in three, or sometimes in four, series: *e.g.*, 1 + 5, 5, 3, a common arrangement; 1 + 5, 4, 3; 1 + 5, 5, 3, 1. Single ocellus of moderate size. Ocelli of series small and nearly uniform, compact, black.

Prosternum 1.53 times wider than long. Distance between chitinous spots 2.85 times width at sinus; 4.6 times dental line. Sinus rather wide, sides a little concave. Teeth small; line of apices a little recurved. Spine short and slender, not bristle-like.

First plate 1.85 times wider than long; sides straight and only slightly converging caudad. Plates smooth or under lens appearing only slightly obscurely and finely roughened. Caudal margins of all plates straight, the caudal corners simply rounded or subrectangular.

Coxal pores very small or minute, circular: 2, 3, 4, 2; 2, 4, 3, 2; 2, 3, 3, 2; 3, 4, 4, 3.

Spines of first legs, $\frac{0,0,2,2,2}{0,0,2,2,1}$ to $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the second to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1(0),0,3,1,1}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Last two pairs of coxae laterally armed.

In the anal legs of male the third joint, or prefemur, is strongly clavately thickened distad but is not extended mesad in a special lobe as in most related species, and the conical process is only obscurely, or not at all, indicated. The fourth joint bears a little caudad of its anterior end the usual conspicuous lobe extending in a mesodorsal direction, but this is smaller than usual and its caudal slope is steeper and shorter, the usual ridge-like caudal extension of the elevation absent or but obscurely indicated but the process at the caudal end of the joint is well developed, subcylindric, bearing a few aculeate hairs, a small number of which also occur on the main lobe. Third, fourth, and fifth articles longitudinally sulcate dorsally, the sulcus of the fourth lying ectad of the process (Plate **8**, fig. 4). Corresponding joints of the penult legs also similarly sulcate.

Claw of female gonopods very short and relatively broad, thin and nearly straight; tripartite, the lobes rather obtuse and distally more or less rounded, the median but little longer than the others. Basal spines short and stout, in surface view with sides parallel or a little diverging distad to the acutely pointed apical portion, broad surface of inner spine nearly at right angles with that of the outer one (Plate **10**, fig. 5). Inner sides of first article of the two gonopods a little diverging from each other cephalad as usual.

Gonopods of male very short; distally bearing a bristle which arises from a slight indentation, no other bristles being observed in type.

Length of types 11–12 mm. A male 11.5 mm. long has antennae 5 mm. long and anal leg 4.5 mm. long, the tenth plate being 1.64 mm. wide.

Pseudomaturus.— Coloration as in *maturus* or a little paler.

Specimens studied considerably more slender than the typical adults, being near 8.5 times longer than width of tenth plate.

Antennae as in *maturus.*

Ocelli 1 + 4, 5, 3; 1 + 3, 4, 3; 1 + 3, 4, 2.

Coxal pores: 2, 3, 3, 2, minute.

Specimens of this stage studied cannot be separated on basis of length from the true *maturus,* being 10–11.5 mm. long.

Type Locality.— Washington (E. Bergroth).

This species seems to be nearest to *P. pitophilus,* which it probably replaces in the north.

Pokabius carinipes (Daday).

Lithobius carinipes Daday, Term. füzetek., 1889, **12**, p. 153, pl. 5, fig. 31. Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 372.

The original description, somewhat rearranged, is as follows: —

Brunneo, medio dorsi fusco fasciato.

Corpore gracili.

Antennis sat longis, 22- articulatis, dense crinitis, in apice violaceis.

Oculis utrinque 15 in seriebus tribus positis.

Coxis pedum maxillarium 4-dentatis.

Laminis dorsalibus inermibus, sparsim ciliatis.

Poris coxalibus uniseriatis 2, 3, 4, 3.

Pedibus analibus [maris] sat crassis, articulo tertio quartoque supra sulcatis, articulo tertio sulco profundiore carinaque in apicem rotundata aculeataque instructo.

Ungue pedum analium simplici; calcaribus 0, 1, 3, 2, 0; articulo primo calcari laterali armato.

Longit. corp. 15 mm. Latit. corp. 2.5 mm.

Femina ignota.

Locality.— Northern California: One male (Joanne Vadona).

The type is in the National Museum at Budapest. It will probably be found that the process referred to the third joint of the anal legs involves also a contiguous lobe at proximal end of the fourth and that the species is a true Pokabius.

Lophobius, subgen. nov.

Pokabius socius Chamberlin.

Plate **12**, fig. 2.

Lithobius sōcius Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 23.

Description.— Dorsum yellowish brown to clear brown, sometimes with a paler median longitudinal line. Head of same shade as dorsum or darker brown, sometimes of dilute chestnut cast, frontal region somewhat paler. Antennae light brown, paler distally. Prosternum and prehensors dark brown or dilute chestnut. Venter yellowish brown, the posterior plates deeper brown. Legs light brown, the posterior pairs darker like the corresponding plates of venter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 80 : 73 : 74 : 85 : 85 : 84.

FIG. 9.— Distribution of Lophobius.

Head subcordate, considerably wider than long (8 : 7). Marginal breaks slight or scarcely evident. Caudal margin widely incurved.

Antennae short as usual, reaching fifth or sixth segment. Articles normally twenty, occasionally up to twenty-five; first seven to twelve moderately long, the others short.

Ocelli thirteen to twenty-two, mostly in four series, occasionally in three or five: *e.g.*, 1 + 5, 4, 3; 1 + 5, 4, 3, 1; 1 + 5, 4, 3, 2; 1 + 5, 5, 3, 2; 1 + 5, 5, 4, 3, 2. Single ocellus much the largest. Organ of Tömösvary well separated from the ocelli.

Prosternum proportionately very wide, being near 1.72 times wider than long. Distance between chitinous spots 2.1 times width at level of bottom of median sinus; 4.9+ times the dental line which is proportionately very short. Teeth small, normally 2 + 2, occasionally extra ones occurring. Margin extending from ectal tooth almost directly ectad for a considerable distance before abruptly bending back caudad. Sinus rather wide, somewhat v-shaped, narrowly rounded at bottom.

Sides of first dorsal plate convex at ends but nearly straight between, only weakly converging caudad. Posterior angles of the eleventh and thirteenth dorsal plates weakly produced; those of the ninth straight or somewhat excised.

Coxal pores moderate in size and circular or sometimes somewhat transversely oval: 3, 4, 4, 3; 4, 5, 5, 4; 5, 6, 6, 5.

Spines of first pair of legs, $\frac{0,0,3,2,1}{0,0,1,3,1}$, less commonly $\frac{0,0,2,2,1}{0,0,1,3,1}$; of the second, $\frac{0,0,3,2,1}{0\ 0,1,3,2}$; of the third to eighth, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the ninth to tenth, $\frac{1(0),0,3,2,2}{0,0,3,3,2}$; of the eleventh, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,1,2}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claws two, the accessory claw small.

Anal legs of male rather slender; the fourth joint a little clavate, with a distinct dorsal longitudinal furrow mesad of which the joint is commonly a little thickened or elevated in ridge-like form, this highest at caudal end but not truly lobate or cristate.

Claw of female gonopods short and broad, tripartite, with lobes acute or rarely with four or five more obtuse teeth or crenulations while, in the other direction, one of the three lobes normally present may be obsolescent. Spines broad, with sides more or less diverging from base to beginning of the acuminate portion (Plate **12**, fig. 2).

Length 12–14 mm.; of anal legs 5–5.6 mm.

Type Locality.— U. S. N. M. No. 784. Utah: near Salt Lake City.

Found also in Utah at various points in Salt Lake, Davis, and Utah counties.

Under stones in hollows and gulches over the foothills and in lower portions of canyons. Often in association with *P. collium.*

Pokabius collium (Chamberlin).

Plate **11**, fig. 4–6.

Lithobius collium Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 23.
Nadabius collium Chamberlin, Bull. M. C. Z., 1913, **57**, p. 62.

Description.— Yellow to light brown, or, more commonly, with a decided tendency to ferruginous or orange; in some part of plates may be dusky. Head sometimes like dorsum but more typically a brighter lemon-yellow, or more reddish orange, or light ferruginous. Antennae mostly bright yellow or orange proximally.

Body in most, slender and 8.5–9 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 39 : 37 : 38 : 45 : 45 : 44.

Head wider than long in ratio (average) of 39 : 36.5. Sides only slightly excurved between eyes and marginal breaks, which are weak or obscure, and the diameter over this region nearly uniform. Caudal margin weakly widely incurved. A distinct transverse sulcus in front of median portion of caudal margining rim with two sublongitudinal sulci diverging cephalad from this. A median longitudinal sulcus as usual in front of suture.

Antennae short, reaching only to the fifth segment. Strongly attenuated distad, the tips being very slender. Articles normally twenty, sometimes up to twenty-three, short, decreasing distad.

Ocelli mostly fifteen to twenty-two in number; arranged mostly in four series: *e.g.*, 1 + 5, 5, 5, 3; 1 + 5, 5, 3, 1.

Prosternum 1.45 times wider than long. Distance between chitinous spots 2.64 times greater than width at level of bottom of median sinus and 5.38 times the dental line which is thus proportionately very short. Median sinus rather shallow and narrow, well rounded at the bottom. Spine small, slender and hair like. Teeth small; line of apices recurved; in some the teeth may be in part almost obsolete (Plate **11**, fig. 4).

First dorsal plate 1.7— times wider than long; sides convex, converging caudad of anterior third. Caudal corners of ninth, eleventh, and thirteenth dorsal plates obliquely excised. Smooth.

Coxal pores small, the most proximal one on each coxa often minute and the most distal one much largest: 2, 3, 3, 2; 3, 4, 4, 3; 3, 4, 4, 4.

Spines of first and second legs, $\frac{0,0,3,2,2}{0,0,1,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the third to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws three; the anterior accessory comparatively long; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Last three pairs of coxae laterally armed.

Anal legs short; slender distad of the fourth article which is thickened; fourth article clavately widening distad, considerably thicker in dorsoventral direction than in lateral, dorsally with a conspicuous ridge-like elevation which, beginning even with the general surface at the proximal end, rises in height to the caudal end where it terminates as a somewhat rounded prominence or crest, which is toward the mesal side and projects dorsomesad, the ridge curving somewhat mesad of directly caudad in its course from anterior to posterior end, the joint longitudinally furrowed mesad of the ridge (Plate **11**, fig. 6).

Gonopods of male small and rounded, wart-like, each bearing distally two long bristles.

Claw of female gonopods of moderate length, considerably curved; tripartite, the three lobes typically distinct with the median largest, but claw occasionally subentire. Spines moderately stout, the outer a little the larger; in view of broader surface the sides are subparallel or slightly divergent to the acutely acuminate apical portion (Plate **11**, fig. 5).

Length 13–16 mm. A male 15 mm. long has antennae 5.5 mm. and anal leg about 4.7 mm. long with the tenth plate 1.64 mm. wide.

Pseudomaturus.— Coloration as in adult or a lighter yellow. Head, antennae, and posterior legs lemon-yellow.

Gonopods of female with claw nearly as in adult or a little thinner. Spines slightly more slender, with the inner one sometimes relatively somewhat smaller.

Dorsal spines of first legs mostly, 0, 0, 2, 2, 1. Ventral spines of twelfth and thirteenth legs more commonly 0, 0, 2, 3, 2.

Anal legs of male as in *maturus* but ridge and crest a little less pronounced.

Length 10–12 mm.

Praematurus.— Yellow, head and posterior plates brightest.

Ocelli 1 + 4, 3, 1; 1 + 4, 3, 2. Ocelli well separated, first of top series large.

Coxal pores: 2, 3, 3, 2, minute.

Claw of female gonopods with claw nearly same as in older stages. Third article with two bristles, second with three or four, and first with four to six. Spines 2 + 2, the inner much the smaller, close together, acutely acuminate from base.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,3,1}$; of the second, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,1}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of anal and penult as in adult.

Length of specimen described 9.25 mm.

Late immaturus.— Yellow with last plates and the head brightest. Antennae like head. Venter paler. Last pair of legs bright yellow.

Antennae with twenty articles which are short and closely compacted.

Ocelli 1 + 4, 3, small, well separated, the single ocellus smaller than first one of upper series.

Prosternum nearly as in adult. Line of apices of teeth more nearly straight. 1.48 times wider than long. Distance between chitinous spots three times width at level of sinus; 4.3 times the dental line. The anterior portion proportionately less wide than in adult and the dental line relatively longer.

Coxal pores minute: 2, 2, 2, 2.

Gonopods of female with a claw present, thin, small, acute and pale with lateral teeth already indicated. Spines 1 + 1, acute, attenuated from base to tip. Second article with two bristles, the first with three or four.

Spining as given for *praematurus*, which is early in that stage as the present is late in the *immaturus*.

Length 9 mm.; antennae 2.6 mm.; anal leg 2.9 mm.; width of tenth plate 1 mm. Widths of head and of the first, eighth, tenth and twelfth plates to each other as 47 : 43 : 46 : 55 : 55 : 53.

Type.— U. S. N. M. No 783. Utah: Salt Lake Co.

Found also in Utah in Salt Lake City, Farmington, Ogden, Provo, Lake Point, Antelope Island, Fremont Island, etc.

This species is very common in Utah under stones over the foothills during the damper months in spring and fall and in the lower parts of the canyons. It was found comparatively abundant under stones on the islands of the Great Salt Lake.

Pokabius pungonius (Chamberlin).

Sozibius pungonius Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 152.

Description.— Dorsum light testaceous, with the caudal plates and the head darker. Antennae yellow proximally and at tips, the remaining portion somewhat darker. Prosternum and caudal ventral plates yellowish, the remaining portion of venter a paler yellow. Posterior pairs of legs bright yellow.

Body of type 8.6— times longer than width of tenth plate. Widths

of head and of first, third, eighth, and tenth plates to each other as 33 : 30 : 35 : 35 : 34.

Head in type precisely equal in length and breadth. Caudal margin straight. Margination distinct and continuous cephalad to eyes, there being no distinct marginal breaks though there is evident the very oblique suture through the marginal rim. Hairs sparse and moderately long. Punctae irregular and weak.

Each antenna in type composed of twenty-one articles of which all but the most proximal and the ultimate are very short and closely united, decreasing distad. Antennae very short, reaching the fifth segment.

Ocelli twelve to fifteen in four series: *e.g.*, 1 + 2, 4, 4, 4; 1 + 3, 4, 3, 1. Ocelli small, black, irregular in form and size, with the series also irregular. Single ocellus small like the others.

Prosternum only 1.4 times wider than long. Distance between chitinous spots 2.65 times as great as width at level of bottom of sinus; 4.24 times length of dental line. Teeth small, black, narrowly rounded or subacute distally; in type 2 + 3; line of apices distinctly recurved. Sinus narrow, sides acutely converging. Spine slender and acute, close to outer tooth.

First dorsal plate 1.66+ times wider than long; sides rounded, conspicuously narrowed caudad of middle. None of plates with caudal angles produced. Posterior plates weakly finely roughened and punctate.

Coxal pores very small or minute: 3, 3, 3, 2.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the second to sixth, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the seventh, $\frac{0,0,2,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eighth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,1,1}{0,0,2,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, the claw one or accessory claw obsolescent; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,1}$, claw one. Last two pairs of coxae laterally armed.

Anal legs of male short and slender, not at all specially modified.

Gonopods of male pale, rounded, bearing two bristles.

Length 11 mm.; antennae and anal legs 4 mm.; width of tenth plate 1.28 mm.

Type Locality.— Colorado: Marshall (T. D. A. Cockerell).

Only the male of this interesting species is known.

Pokabius arizonae, sp. nov.

Description.— Light orange-yellow with the head and the posterior plates a deeper orange, the frontal region of head palest. Antennae like head but lighter yellow distad. Prosternum and pre-

hensors light orange. Legs yellow, the posterior pairs more brightly pigmented, light orange.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 61 : 56 : 58 : 65 : 67 : 62.

Head in type slightly longer than wide (63 : 61). Rather strongly narrowed cephalad. Marginal breaks weak, oblique. Caudal margin weakly widely incurved.

Antennae short. Articles twenty-four; first four moderately long, the others decreasing gradually distad; ultimate shorter than the two preceding ones taken together.

Ocelli 1 + 4, 4, 2. Single ocellus largest though not greatly so.

Prosternum 1.55 times wider than long. Distance between chitinous spots 2.68 times width at level of sinus; 4.25 times dental line. Teeth apically narrowly rounded; distance between teeth of each pair about equal to that between the two mesal ones. Sinus broadly v-shaped, the sides straight. Spine clearly stouter than the bristles, straight, regularly acutely acuminate.

First dorsal plate widest a little cephalad of middle, not strongly narrowed caudad; 1.6 times wider than long. Posterior corners of the ninth, eleventh, and thirteenth dorsal plates obliquely excised.

Coxal pores small, widely separated: 2, 2, 3, 2.

Spines of first to fourth pairs of legs, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the fifth to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 2}{0, 0, 3, 3, 2}$ or $\frac{0, 0, 3, 1, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws three, with the accessory claws small but distinct.

Anal legs of male slender, not modified.

Gonopods of male well exposed; bearing two bristles.

Length 12 mm.

Type.— M. C. Z., No. 285, Arizona: Tucson (W. M. Wheeler).

This species is known from a single male. It is aberrant.

Pokabius helenae, sp. nov.

Plate 12, fig. 3.

Description.— Dorsum yellowish brown to clear brown, with sometimes part of the plates dusky. Head mostly more or less ferruginous with frontal region a little paler. Prosternum and prehensors testaceous of a dilute ferruginous tinge. Venter yellow to yellowish brown, with caudal plates ferruginous. Legs like corresponding plates of venter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 76 : 72 : 74 : 85 : 86 : 84.

Head widest immediately caudad of eyes, a little wider than long. Caudal margin mesally incurved. Marginal breaks slight.

Antennae short and slender, usually reaching to the fifth segment. Articles normally twenty, moderate, sometimes the first seven to ten markedly and abruptly longer than those succeeding. Ultimate article longer than the two preceding together.

Ocelli fifteen to eighteen in three or more frequently in four series: *e.g.*, 1 + 5, 5, 4; 1 + 5, 4, 4, 3; 1 + 5, 5, 3, 2; 1 + 5, 5, 4, 2; 1 + 5, 6, 5, 1; 1 + 6, 5, 4, 2. Single ocellus clearly largest, elliptic. Organ of Tömösvary relatively small.

Prosternum 1.65 times wider than long. Distance between chitinous spots 2.5 times width at level of sinus; 4.33+ times the dental line. Sides of anterior portion convex and rounding out considerably laterad. Teeth very small, narrow at base, distally rounded. Sinus strictly v-shaped. Spines slender, distally bristle-like, straight or nearly so.

First dorsal plate a little widest anteriorly; sides substraight and not strongly converging caudad to the rounded posterior corners; in type near 1.9 times wider than long. Posterior corners of the thirteenth plate weakly produced, those of the ninth and eleventh typically, somewhat concavely, excised.

Coxal pores: 3, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 3; 4, 5, 5, 4; etc.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the third to ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 2}{0, 0, 3, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the thirteenth and penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws three; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one. Last two pairs of coxa laterally armed or spine of penult coxae sometimes absent.

Anal legs of male rather slender; the fourth joint a little crassate, a little incurved or depressed above and weakly elevated at distal end.

Claw of female gonopods short, tripartite, the lobes all acute and distinct, the median longest though not greatly so. Spines moderately long and of moderate proportionate breadth, sometimes appearing bent mesad near middle of length, the sides typically subparallel from base to apical portion.

Length 9–13 mm.

TYPE.— M. C. Z., No. 185. Montana: Helena (W. M. Mann).

Pokabius castellopes (Chamberlin).

Plate **12**, fig. 1.

Lithobius castellopes Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 158. Pomona coll. journ. ent., 1910, **2**, p. 373.

Description.— Dorsum testaceous; head but little paler. Antennae light; paler distad than proximad. Legs yellowish, the caudal pairs more deeply pigmented and brown proximad, yellowish distad.

Body in type 7 times, or a little less, longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 28 : 26 : 27.5 : 32 : 35 : 33.

Head a little longer than wide (30 : 28.5). Cordate. Caudal margin mesally incurved. Head considerably narrowed cephalad. Sparsely clothed with rather long hairs. Smooth. Marginal breaks distinct.

Antennae short; slender distad. Articles short and very short, decreasing distad as usual.

Ocelli twelve in three series: 1 + 5, 4, 2. Patch elongate. Ocelli separated, not contiguous, those of top series considerably largest.

Prosternum 1.4 times wider than long. Distance between chitinous spots 2.38 times greater than width at level of bottom of median sinus; 3.58 times the dental line. Median sinus strictly v-shaped, with sides straight. Teeth small and pale; line of apices recurved.

First dorsal plate 1.8 times wider than long, widest anteriorly and considerably narrowed caudad. Caudal minor plates with posterior corners obliquely excised, but line of excision short. Smooth.

Coxal pores very small: 2, 3, 3, 2.

Spines of first to third pairs of legs, $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fourth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,1}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$, claw one. Last two pairs of coxae laterally armed.

Anal and penult legs in the male considerably swollen. Anal legs short; fourth joint thick, somewhat bowed ventrad with dorsal surface concave, saddle-like and at distal end elevated into a conspicuous lobe which narrows to an edge dorsad and is truncate caudad on level with end of joint or distally a little extending beyond it; lobe on caudal surface near apex bearing a caudally directed spine; dorsal surface of joint cephalad of the lobe longitudinally sulcate (Plate **12**, fig. 1).

Gonopods of male well exposed; distally truncate; sides subparallel.

Length of type (♂) 8.8 mm.; antennae and anal legs 3 mm.; tenth plate cir. 1.28 mm. wide.

TYPE LOCALITY.— California: Shasta Springs (1902).

POKABIUS EREMUS, sp. nov.

DESCRIPTION.— Brown, with the head darkest. Antennae light brown. Venter light brown. Legs pale, posterior pairs darker, light distally.

Body moderately narrowed cephalad from the tenth plate with the first dorsal plate slightly narrower than the third and much narrower than the head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 57 : 50 : 51 : 62 : 64 : 64.

Head slightly wider than long (57 : 56 or 55). Widest a little caudad of eyes from where narrowing regularly to the caudal corners, a little indented or incurved at level of suture where the marginal break would be if present. Caudal margin straight. Conspicuously narrowed cephalad.

Antennae of intermediate length, reaching to sixth segment. Articles twenty to twenty-one, of intermediate length to rather long, subcylindric, each only slightly widening distad, of nearly uniform proportions; ultimate shorter than the two preceding ones taken together.

Ocelli in type twelve in three series: 1 + 5, 4, 2. Those of the upper series large, regular, deeply pigmented. Single ocellus not larger than the caudal ones of series, or but little so, and not otherwise sharply differentiated. Ocelli of most ventral series considerably smaller and paler than the others in the type.

Prosternum in type 1.425 times wider than long. Distance between chitinous spots 2.8 times width at level of bottom of median incision; 4.5 times length of dental line, the anterior portion of the prosternum being especially narrow at its cephalic end and the dental line correspondingly short. Median incision large; sides concave; narrowly rounded at bottom; wide, the distance between inner teeth being greater than that between the teeth of each pair. Spine rather stout at base; long and slenderly acuminate; inserted a considerable distance caudad of level of teeth. Margin sloping directly ectocaudad from base of outer tooth.

First dorsal plate with sides only weakly convex, regularly and only moderately converging caudad; in type *cir.* 1.78 times wider than long. Posterior corners of ninth, eleventh, and thirteenth dorsal plates obliquely excised (the right corner of ninth plate in type is not thus excised) but the caudal margin is a little angularly extended caudad just mesad of inner end of the excision.

Coxal pores small, especially so the proximal ones: 4, 4, 4, 5.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$; of the second to seventh, $\frac{0, 0, 3, 2, 2}{0, 0, 1, 3, 2}$; of the eighth and ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 2, 2}{0, 1, 3, 3, 2}$ or $\frac{0, 0, 3, 1, 2}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws three, the anterior accessory being long and slender; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, the claw single. Last two pairs of coxae laterally armed.

Claw of female gonopods long and rather slender, strongly curved; tripartite, with the lobes all acute and the median not greatly exceeding the lateral ones. In ventral view the outer basal spine is narrowest near the middle, the sides incurving; the acuminate apical portion is very short, with one or both edges denticulate and the tip truncate. The outer spine is larger than the inner one which appears acuminate from very base and is distally acute.

Length of type (♀), 8.5 mm.

Type.— M. C. Z., No. 187. British Columbia: Kaslo.

The spining of the legs of this species at once differentiates it from the others at present known. It is the only one in which the tibia of the anterior legs bears two dorsal spines, and in which the tibia of the penult leg is armed dorsally.

Simobius gen. nov.

Marginal interruptions of head slight and oblique or sometimes scarcely manifest.

Antennae short; composed in type species of twenty-one or twenty-two articles.

Eyes composed of seriate ocelli; single ocellus distinctly differentiated, large.

Prosternal teeth 2 + 2; line of apices recurved. Spines slender, bristle-like.

Posterior corners of 11th and 13th plates (in type-species) weakly produced.

Coxal pores small, circular; uniseriate.

Claw of female gonopods tripartite, the median tooth not much

FIG. 10.— Distribution of Simobius.

exceeding the lateral ones. Spines 2 + 2, of intermediate length and breadth. First article of gonopods not excavated proximally.

Tarsi of anterior legs divided.

Anal legs of male short and moderately inflated; without special processes or modifications. Penult legs in male with fifth article bearing at the distal end on the dorsal surface a conspicuous process.

Last two pairs of coxae laterally armed. Third joint of all legs caudad of the second pair normally with three spines. Fifth joint of all legs between first or second and twelfth with two dorsal spines. In type species, dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1; claw single. Dorsal spines of penult legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 3, 2; claws three. Dorsal spines of twelfth legs 1, 0, 3, 1, 2; ventral 0, 0, 3, 3, 2.

Length 11 mm. and over.

Type.— *S. ginampus* (Chamberlin).

The type species is the only one thus far known. In the character of the modification of the penult leg in the male, the genus suggests Guambius but is very readily distinguished from that genus in other characters.

Simobius ginampus (Chamberlin).

Plate **12**, fig. 4, 5.

Lithobius ginampus Chamberlin, Ann. Ent. soc. Amer., 1911, 1909, **2**, p. 187.

Description.— Dorsum yellowish brown or testaceous to dark smoky brown, or somewhat mahogany-brown, when in full color showing a longitudinal darker stripe on all or most of the major plates. Head from light chestnut, in paler specimens, to mahogany or almost black in the darker ones. Antennae light brown to chestnut proximally, paler distally Prosternum from light brown to dark smoky brown; prehensors lighter, rufous, distad. Venter yellowish to brown, the last several plates darker. Legs yellowish to brown, nearly uniform.

Body proportionately wide, being commonly only 7, or less, times longer than width of the tenth plate. Body considerably narrowed cephalad with the first plate narrower than the head and than the third, the latter being but little narrower than the head. Widths of head and of first, third, eighth, and tenth plates to each other as 48 : 45 : 47 : 55 : 50.

Head wider than long in about the ratio 48 : 45. Rather strongly

narrowed cephalad from caudal edge of eyes. Immediately in front of the suture is a median depression and a little in front of this a dot-like second impression; immediately caudad of the suture is a dot-like impression each side of the median line and a second similar pair farther caudad; the usual semicircular impression just in front of the caudal margin. Head otherwise nearly smooth, shining.

Antennae very short; reaching fifth or sixth segment. Articles twenty-one or twenty-two, short and subcylindric; ultimate rather long.

Ocelli of each eye mostly ten or twelve in three series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 4, 2; 1 + 4, 4, 3. Single ocellus large, ovate; of the other ocelli, the most caudal of the dorsal series are largest, the others decreasing cephalad and ventrad.

First dorsal plate near 1.8 times wider than long. Most major plates showing a pair of furrows diverging from the anterior end caudad and the usual short, transverse, submarginal sulcus on each side near beginning of caudal third of length. Moderately roughened, the caudal plates more distinctly so. Posterior angles of ninth plate with caudal edge straight or a little bent cephalad; those of eleventh and thirteenth a little produced caudad.

Ventral plates with the usual three longitudinal sulci. A submedian transverse impression which is most distinct on plates toward caudal end.

Coxal pores small, decreasing proximad: 3, 4, 4, 3; 3, 4, 5, 3; 4, 5, 4, 3; 4, 5, 5, 4; etc.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,2}$ or $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the second, $\frac{0,0,2,2,2}{0,0,1,3,2}$ or $\frac{0,0,2,2,1}{0,0,1,3,2}$; of the third to tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,1,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,0}{0,1,3,3,2}$, claws three; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$, claw one. Last two pairs of coxae laterally armed.

Anal and penult legs of male short and moderately inflated with the tibial joints abruptly more slender. Anal legs without special lobes. Penult legs with the fifth article having dorsocaudal corner of distal end obliquely excised as in Arenobius, etc., and bearing upon the oblique surface a conspicuous subcylindric but laterally compressed, process which is sublongitudinal in position and is as high, or nearly as high, at proximal as at distal end; free surface of lobe obliquely truncate, bearing but few bristles (Plate **12**, fig. 4).

Gonopods of male well exposed, with sides convex and the distal edge oblique and nearly straight, the ectal side being shorter than the mesal; bearing two bristles.

Claw of female gonopods tripartite, the lobes or teeth short and

usually rather blunt, the median being longest though not greatly so. Outer spine longer than the inner; a little acuminate from base distad with the sides more or less incurved near the middle; apical portion short, narrowly rounded at tip (Plate **12**, fig. 5).

Length of types 11 to 14 mm. A male 13.5 mm. long has antennae 5 mm. long, anal legs 4 mm. long, and the tenth plate 2 mm. wide.

Type Locality.— Washington: Pullman (W. M. Mann).

Found also in Alaska on Forrester Island (Harold and R. W. Heath).

PLATE 1.

PLATE 1.

Sozibius pennsylvanicus Chamberlin. (Upsal, Pa.).

Fig. 1. Fourth joint of anal leg, mesal view.

Fig. 2. Ocelli of right eye and organ of Tömösvary, showing typical relations.

Fig. 3. Ocelli of left eye of another specimen, showing larger actual and relative size of ocelli.

Fig. 4. Claw of gonopod of ♀ viewed at right angles to its concave surface.

Fig. 5. Basal spines of left gonopod of ♀, ventral view.

Sozibius tuobukus (Chamberlin). (Hot Springs, N. C.).

Fig. 6. Third and fourth joints of right anal leg of ♂, dorsal view.

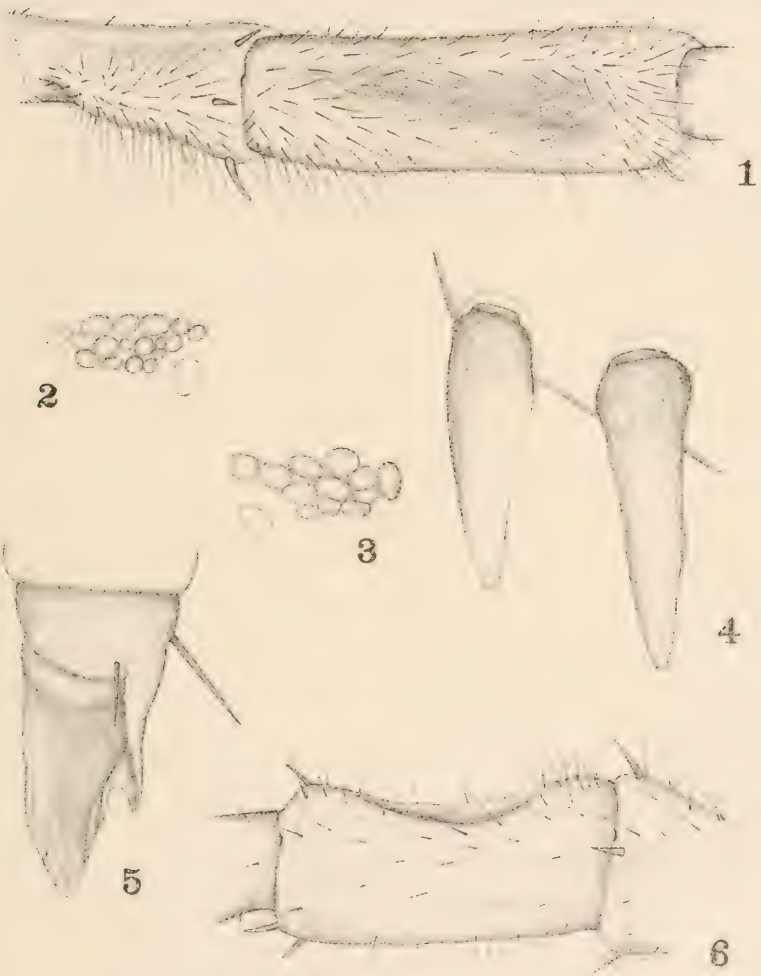
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PLATE 2.

PLATE 2.

Sozibius tuobukus (Chamberlin). (Hot Springs, N. C.).

Fig. 1. Claw of right gonopod of ♀, subventral view.
Fig. 2. Basal spines of left ♀ gonopod, ventral view.

Sozibius providens (Bollman).

Fig. 3. Anterior portion of prosternum. (Russellville, Tenn.).
Fig. 4. Claw of right gonopod of ♀, subventral view. (Russellville, Tenn.).
Fig. 5. Basal spines of left gonopod of ♀, ventral view. (Russellville, Tenn.).
Fig. 6. Basal spines of right gonopod of ♀. (Type, Bloomington, Indiana, showing, in comparison with Fig. 5, extent of variation in form).

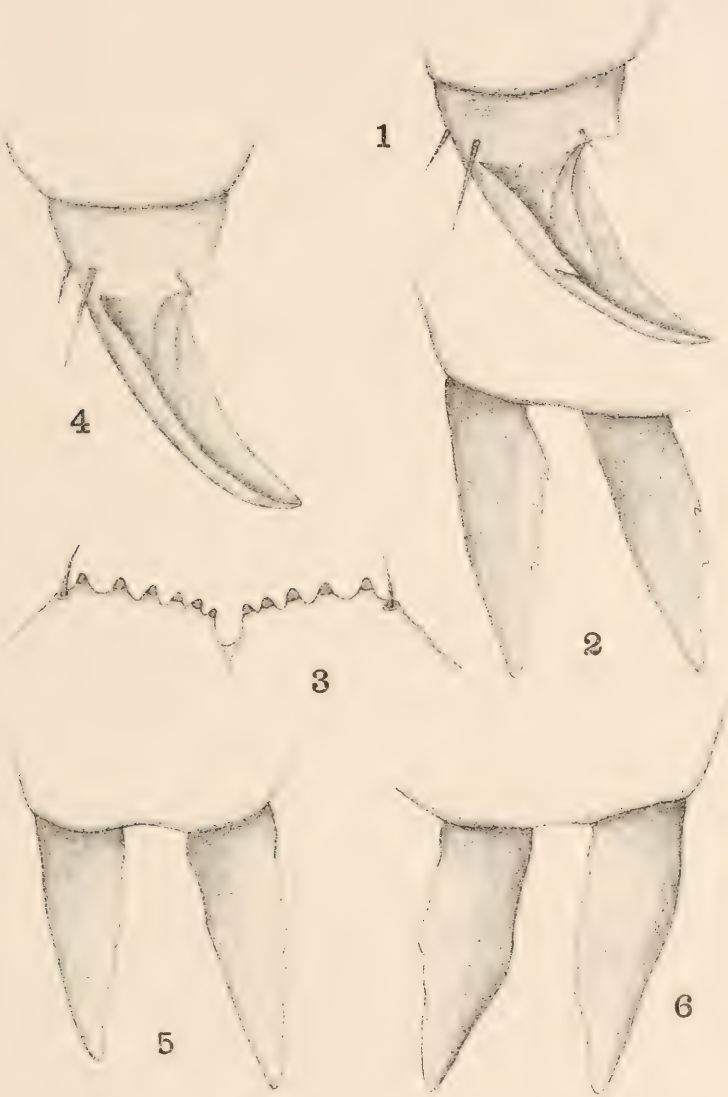
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PLATE 3.

PLATE 3.

Pampibius paitius (Chamberlin). (Unaka Springs, Tenn.).

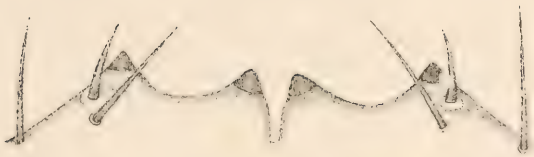
Fig. 1. Anterior portion of prosternum.
Fig. 2. Ocelli of left eye and organ of Tömösvary.
Fig. 3. Third and fourth joints of left anal leg of ♂, mesal view.
Fig. 4. Basal spines of right gonopod of ♀, subventral view.

Typhlobius kebus Chamberlin. (Santa Barbara, Cal.).

Fig. 5. Anterior portion of prosternum.
Fig. 6. Claw of right gonopod of ♀, subventral view.

Typhlobius coecus (Bollman). (Saluda, N. C.).

Fig. 7. Basal spines of left gonopod of ♀, ventrål view.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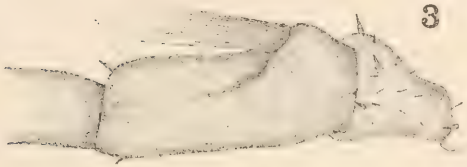
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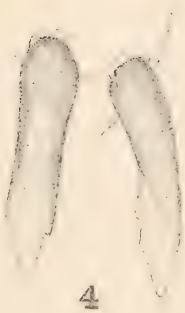
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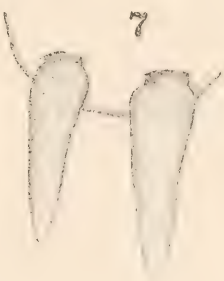
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PLATE 4.

PLATE 4.

Typhlobius coecus (Bollman). (Saluda, N. C.).

Fig. 1. Anterior portion of prosternum.
Fig. 2. Claw of left gonopod of ♀, ventral view.

Paitobius naiwatus (Chamberlin). (Landrum, N. C.).

Fig. 3. Anterior portion of prosternum.
Fig. 4. Basal spines of left gonopod of ♀, ventral view.

Paitobius carolinae (Chamberlin).

Fig. 5. Anterior portion of prosternum.
Fig. 6. Basal spines of left gonopod of ♀, ventral view.

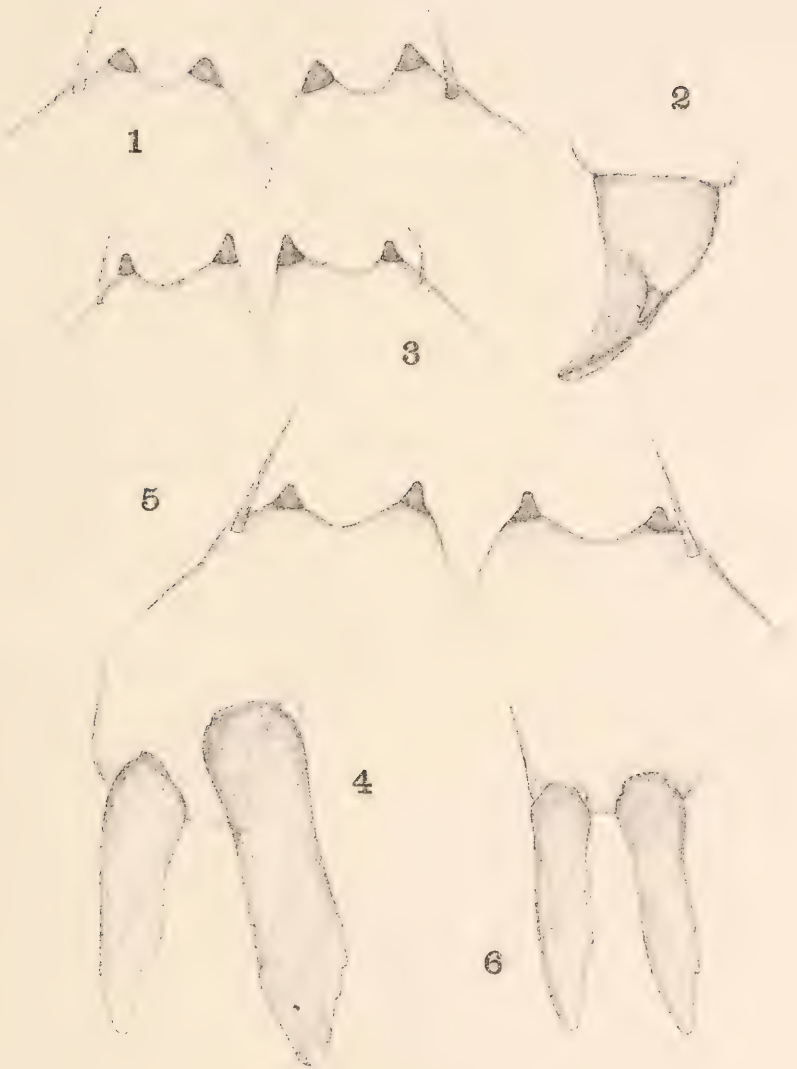
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PLATE 5.

PLATE 5.

Paitobius tabius (Chamberlin). (Johnson City, Tenn.).

Fig. 1. Basal spines of left gonopod of ♀, view a little ectad of ventral.

Paitobius zinus (Chamberlin).

Fig. 2. Basal spines of left gonopod of ♀, ventral view.

Paitobius adelus Chamberlin. (Upsal, Pa.).

Fig. 3. Basal spines of left gonopod of ♀, ventral view.

Taiyubius angelus (Chamberlin). (Santa Barbara, Cal.).

Fig. 4. Anterior portion of prosternum.
Fig. 5. Basal spines of left gonopod of ♀.

Taiyubius harrielae (Chamberlin). (Colorado).

Fig. 6. Basal spines of left gonopod of ♀, ventral view.

Nadabius oreinus Chamberlin. (Santa Barbara, Cal.).

Fig. 7. Anterior portion of prosternum.

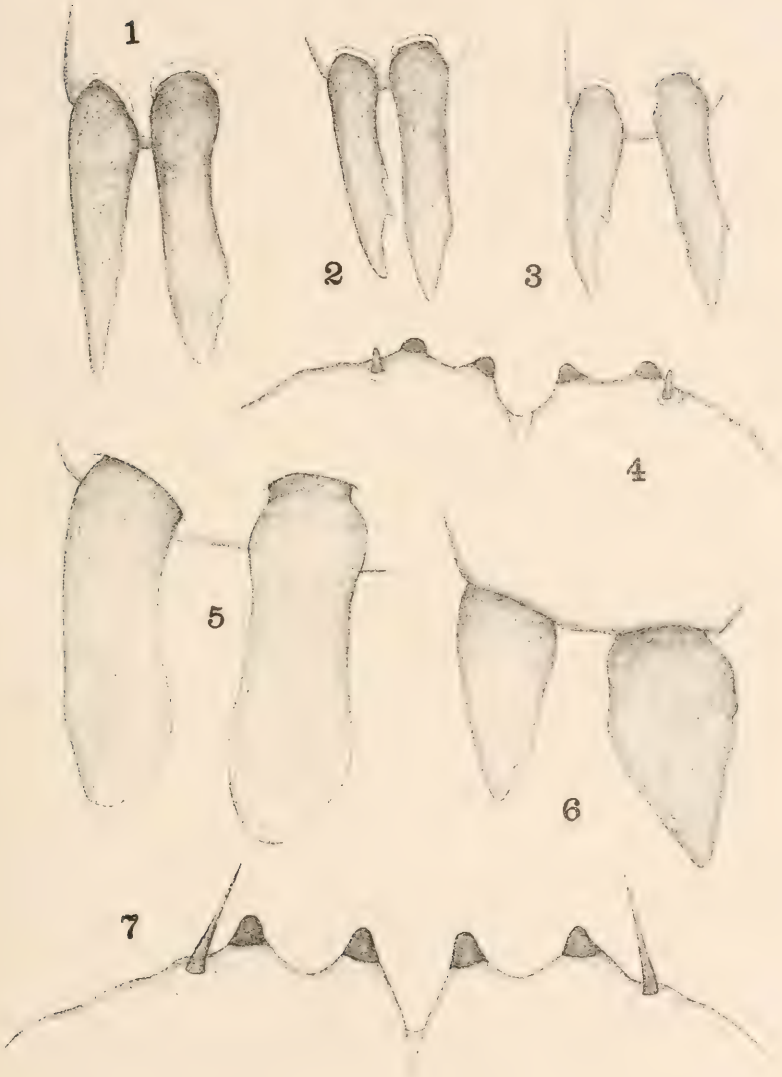
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PLATE 6.

PLATE 6.

Nadabius oreinus Chamberlin. (Santa Barbara, Cal.).

Fig. 1. Basal spines of left gonopod of ♀, ventral view.

Nadabius mesechinus (Chamberlin). (Meacham, Oregon).

Fig. 2. Basal spines of left gonopod of ♀.

Nadabius aristeus Chamberlin. (Macapin, N. J.).

Fig. 3. Basal spines of left gonopod of ♀.
Fig. 4. Anterior portion of prosternum.

Sonibius parvus Chamberlin. (Grout's Mill, Vt.).

Fig. 5. Basal spines of left gonopod of ♀, ventral view.

Tidabius cantabrigensis (Meinert). (Type, Cambridge, Mass.).

Fig. 6. Anterior portion of prosternum.
Fig. 7. Basal spines, right gonopod of ♀, ventral view.

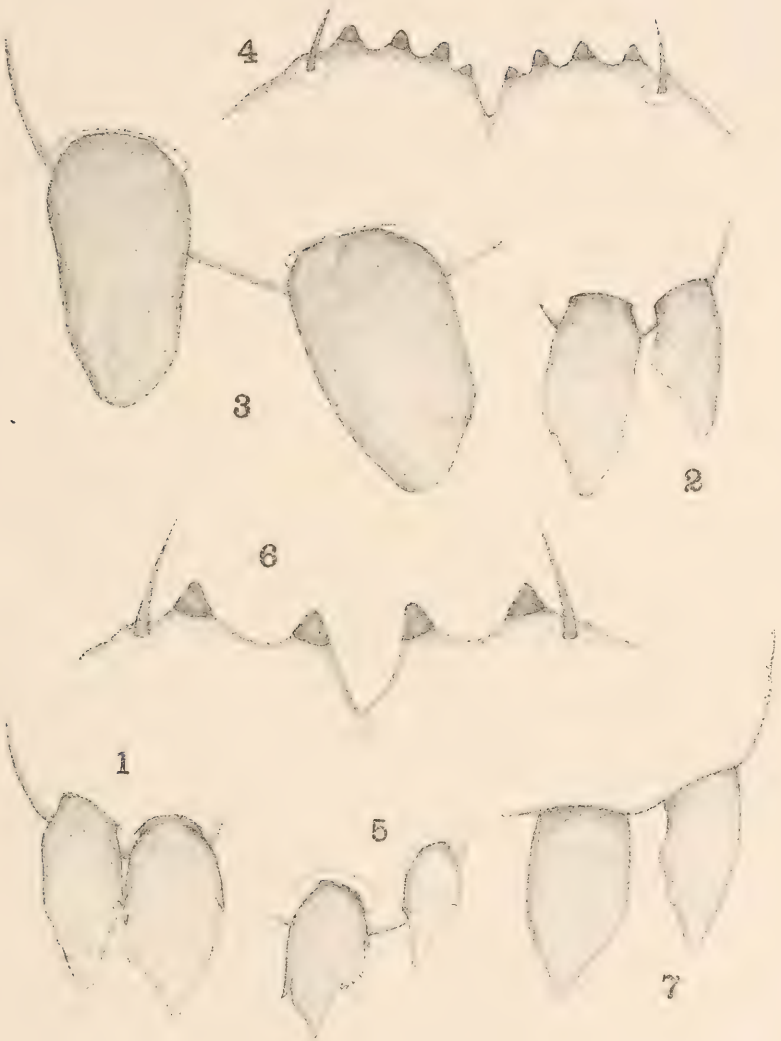
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PLATE 7.

PLATE 7.

Nadabius pullus (Bollman).

Fig. 1. Anterior portion of prosternum. (Paratype, Bloomington, Ind.).
Fig. 2. Basal spines of left gonopod of ♀, ventral view. (Paratype, Bloomington, Ind.).
Fig. 3. Portion of tibia and first tarsal joint of anal leg of ♂, mesal aspect, showing tibial crest. (Lynchburg, Va.).

Nadabius coloradensis (Cockerell). (Manitou, Col.).

Fig. 4. Basal spines of right gonopod of ♀, ventral view.

Nadabius eigenmanni (Bollman).

Fig. 5. Basal spines of left gonopod of ♀, ventral view.

Nadabius iowensis (Meinert).

Fig. 6. Basal spines of left gonopod of ♀, ventral view.

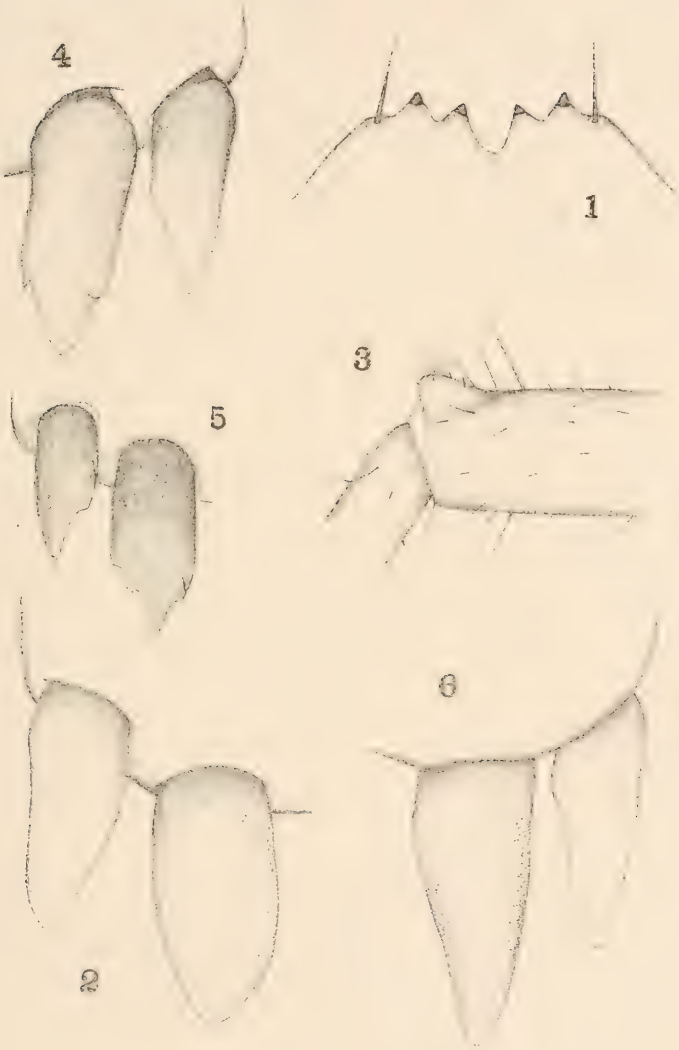
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PLATE 8.

PLATE 8.

Nadabius iowensis (Meinert). (Boone, Iowa).

Fig. 1. Portion of tibia and tarsus of anal leg of ♂, mesal view, showing crest.

Pokabius bilabiatus (Wood). (DeWitt, Iowa).

Fig. 2. Basal spines of left gonopod of ♀, ventral view.

Pokabius bilabiatus verdescens Chamberlin. (Type, East Peoria, Ill.).

Fig. 3. Femur and portion of the two contiguous joints of left anal leg of ♂ showing the characteristic lobes.

Pokabius iginus (Chamberlin). (Washington).

Fig. 4. Femur and portion of prefemur and tibia of right anal leg of ♂, dorsal view.

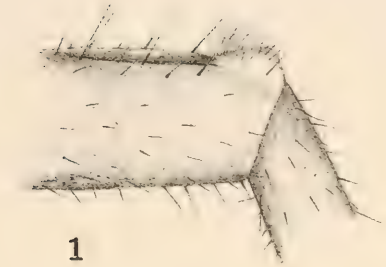

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PLATE 9.

PLATE 9.

Pokabius clavigerens (Chamberlin). (Pacific Grove, Cal.).

Fig 1. Femur and part of prefemur and tibia of left anal leg of ♂, subdorsal view.

Fig. 2. Basal spines of left gonopod of ♀.

Pokabius disantus Chamberlin. (Type, Laurel Canyon, Cal.).

Fig. 3. Femur and portion of the two contiguous joints of the left anal leg of the ♂, subdorsal view.

Pokabius pitophilus Chamberlin. (Truckee, Cal.).

Fig. 4. Femur and portion of the two contiguous joints of the left anal leg of ♂, mesal view.

Fig. 5. Basal spines of right gonopod of ♀, ventral view.

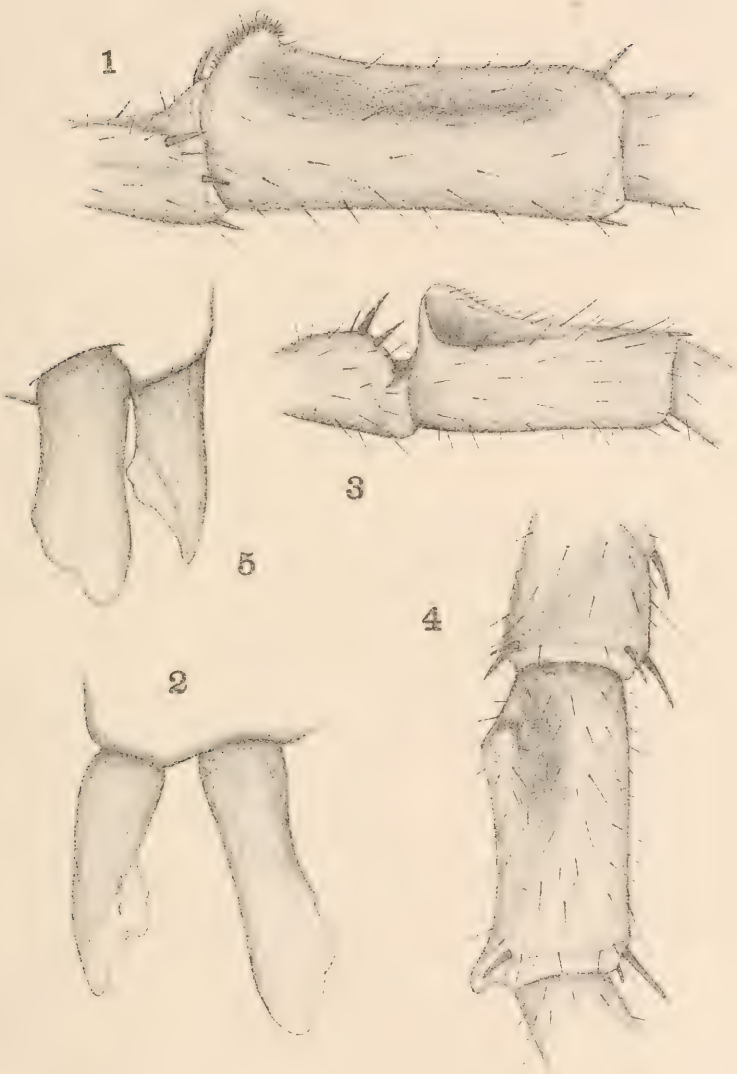
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PLATE 10.

PLATE 10.

Pokabius centurio (Chamberlin). (Las Valles, N. M.).

Fig. 1. Femur and portion of prefemur and tibia of anal leg of ♂, view a little ectad of dorsal.

Fig. 2. Basal spines of left gonopod of ♀, ventral view.

Pokabius utahensis (Chamberlin).

Fig. 3. Femur and portion of the two contiguous joints of the anal leg of ♂, subdorsal view. (Provo Canyon, Utah Co., Utah).

Fig. 4. Basal spines of left gonopod of ♀, ventral view (Little Willow Canyon, Salt Lake Co., Utah).

Pokabius iginus (Chamberlin). (Paratype, Washington).

Fig. 5. Basal spines of left gonopod of ♀, ventral view.

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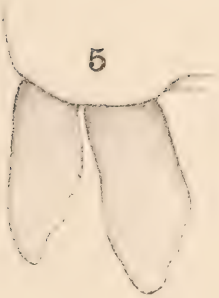
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PLATE 11.

PLATE 11.

Pokabius gilae Chamberlin. (Thatcher, Arizona).

Fig. 1. Femur and portion of prefemur and tibia of anal leg of ♂, dorsal view.

Pokabius sokovus (Chamberlin). (Cotype, Las Vegas, Nev.).

Fig. 2. Femur and portion of the two contiguous joints of anal leg of ♂, mesal view.

Fig. 3. Basal spines of right gonopod of ♀, ventral view.

Pokabius collium (Chamberlin).

Fig. 4. Anterior portion of prosternum. (Antelope Is., Gt. Salt Lake, Utah).

Fig. 5. Basal spines of left gonopod of ♀. (Antelope Is., Gt. Salt Lake, Utah).

Fig. 6. Femur and portion of the two contiguous joints of anal leg of ♂, dorsal view.

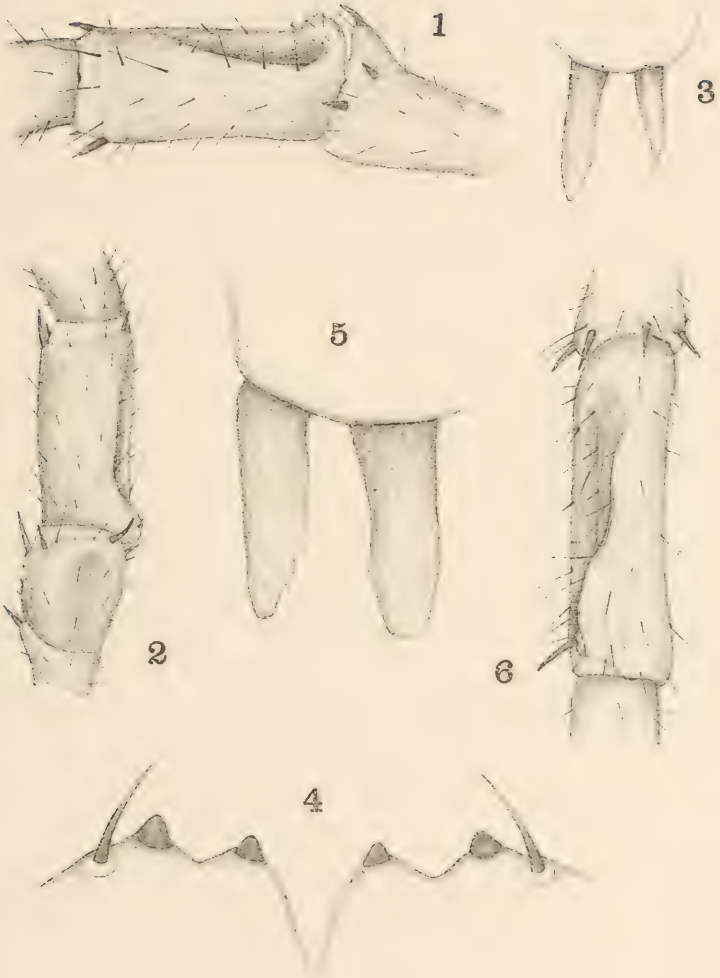
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PLATE 12.

PLATE 12.

Pokabius castellopes (Chamberlin). (Shasta Springs, Cal.).

Fig. 1. Femur and portion of the two contiguous joints of anal leg of ♂, lateral view.

Pokabius socius (Chamberlin). (Provo, Utah).

Fig. 2. Basal spines of left gonopod of ♀, ventral view.

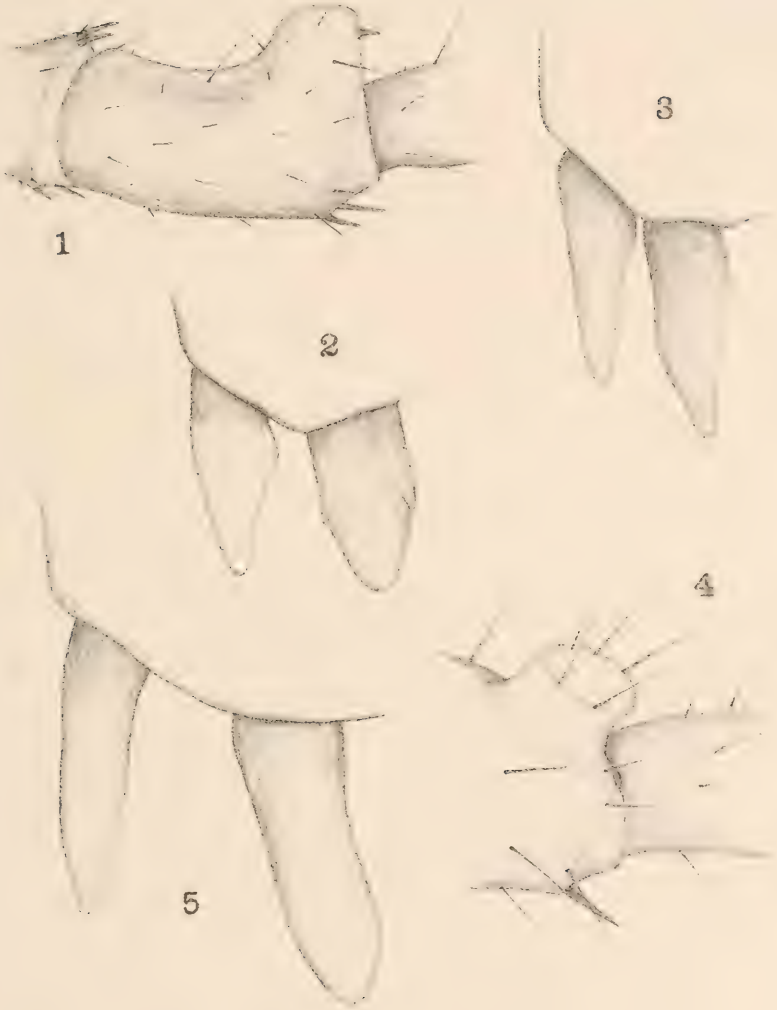
Pokabius helenae Chamberlin. (Helena, Montana).

Fig. 3. Basal spines of left gonopod of ♀, ventral view. (Helena, Montana).

Simobius ginampus (Chamberlin). (Pullman, Washington).

Fig. 4. Portion of fifth and sixth joints of penult leg of ♂, dorsal view, showing the characteristic tibial process.

Fig. 5. Basal spines of left gonopod of ♀, ventral view.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THE ETHOPOLIDAE OF AMERICA NORTH OF MEXICO.

By Ralph V. Chamberlin.

With Six Plates.

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No. 7.— *The Ethopolidae of America North of Mexico.*

By Ralph V. Chamberlin.

The Ethopolidae (Chamberlin, Bull. M. C. Z., 1915, **59**, p. 531) embraces a group of genera in the Lithobioidea characterized chiefly by having the coxal pores in several series.

Bothropolys (*βόθρος*, pit, and *πολύς*, many) was proposed by Wood in 1863 for several American species having the characteristic mentioned. Later Stuxberg (Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 3, p. 5–22) merged the group again with Lithobius which he subdivided into subgenera according to the angulation of the dorsal plates, a system which, though manifestly in large part artificial, has been followed by nearly all subsequent students.

Latzel in his work on Die Myriopoden der Österreichisch-Ungarischen Monarchie (1880, **1**, p. 35) regarded Wood's grouping as natural. In speaking of it he writes:—

> er, was nur löblich ist, alle Arten der Gatt. Lithob. mit zahlreichen, ungeordneten oder in unregelmässige Reihen vertheilten Hüftporen unter dem gemeinsamen Gruppennamen Bothropolys zusammenfasste. Leider ist daran doch zweierlei zu tadeln: einmal ist der Name Bothropolys entschieden falsch gebildet, da er richtig Polybothrus heissen sollte; dann hat Wood unterlassen, auch consequenterweise den Rest der Gattung zu benennen, der etwa mit dem Namen Oligobothrus zu belegen gewesen wäre. Ich bin geneigt zu glauben, dass diese Zweitheilung der Lithobius-Arten im Sinne Wood's sehr natürlich ist, da man bezüglich der Hüftporen nie, bezüglich der Zahnbildungen an den Rückenschilden, besonders beim Subgenus Neolithobius und Hemilithobius leicht im Verlegenheit geräth. Die Gruppe Polybothrus umfasst bisher nur (18 bis 45 mm) grosse Formen, die sich auch durch zahlreiche (nämlich 12–20) Hüftzähne auszeichnen. In die Gruppe Oligobothrus gehören Arten, deren Körperlänge von 31 mm bis unter 8 mm heruntersinkt, und deren Hüftzähne meist in der Zahl 10–16 auftreten, oder andererseits fast völlig verkümmert sind. Ferner haben die Arten der Gruppe Polybothrus in der männlichen Form gut entwickelte Genitalanhänge, während die Männchen der Gruppe Oligobothrus stets, bis auf 2 kleine behaarte Wärzchen, verkümmerte Genitalanhänge haben.

But while thus recognizing the naturalness of Wood's system and urging objections to that of Stuxberg, Latzel adopts the latter throughout "wegen ihrer sonstigen Bequemlichkeit," a procedure which it seems difficult to justify. Of course the suggestion of a change from Bothropolys to Polybothrus on etymological grounds cannot be fol-

lowed; while the name Oligobothrus was wholly unnecessary as its function was already filled by Lithobius *sens. str.*, whether the groups were to be recognized as genera or as subgenera.

In 1896 Brolemann (Ann. Ent. soc. France, **65**, p. 45) recognized Bothropolys as a subgenus but unnecessarily used Latzel's Oligobothrus for Lithobius *sens. str.*

In 1901 Pocock (Ann. mag. nat. hist., ser. 7, **8**, p. 448) considered Bothropolys as proposed by Wood a valid genus, and Verhoeff (Bronn's Thierreich, 1907, **5**, p. 234 *et seq.*) also accepts it and at the same time separates from it the European species as a distinct genus p. 237:—

k. Antennen fast konstant aus 20 Gliedern bestehend (selten 17 bis 23). Nordamerikanische und orientalische Formen.... *Bothropolys.*

l. Antennen aus 30–80 Gliedern bestehend. Paläarktische Formen. *Polybothrus.*

Polybothrus is attributed to Latzel; but manifestly this name cannot be thus used, inasmuch as it was proposed, as seen above in the passage quoted from that author, strictly as an etymological reformation of and substitute for Bothropolys and must be wholly eliminated from use as a synonym of the latter. Verhoeff divides Polybothrus into subgenera by applying the Stuxberg system; but unfortunately he lists no species for any of these groups and the names given are therefore difficult to apply and also really without standing. We may, however, use the name Eupolybothrus for the European genus of which *Lithobius grossipes* C. Koch may be specified as the type. It is quite possible that there will be found to exist among the Eurasian species other genera. In North America the species of the Ethopolidae fall into three genera. It will be noted that the American genera differ from the European not only in the smaller number of antennal joints, a character not applicable in younger specimens, but especially in the presence of a stout ventral spine on the posterior coxae. The latter character is developed in very young specimens. This spine is present while the coxal pores are still uniseriate; and as a ventral coxal spine is present in no other American genera excepting the rare Zinapolys, its presence may serve in separating the young of these genera from the other lithobioids (*cf.* Can. ent., 1911, **43**, p. 379).

Among European Lithobiidae, the species *Lithobius dalmaticus* Latzel also has the coxae of the anal legs, though not of the penult, similarly armed with a stout ventral spine. This species is evidently generically distinct from the American Zinapolys and may stand as the type of a new genus, Abrotobius.

Key to Genera of Ethopolidae.

a. Posterior coxae unarmed ventrally; articles of antennae 30 or more.
Eupolybothrus, gen. nov.

aa. Coxae of last one or two pairs of coxae armed ventrally with a stout spine; articles of antennae normally 20 (rarely varying to as many as 27).

b. Lateral margining of head continuous, not interrupted or broken (Plate **1**, fig. 1); basal spines of ♀ gonopods 2+2.

c. Prosternum with a distinct diastema in dental line on each side in which the spine is inserted; only anal coxae ventrally armed.
Zygethopolys, gen. nov.

cc. Prosternum without diastema in dental line, the spine inserted at each anteroectal angle; last 2 pairs of coxae ventrally armed.
Bothropolys Wood.

bb. Lateral margining of head discontinuous or interrupted laterally (Plate **4**, fig. 1); basal spines of ♀ gonopods 3 + 3 or 4 + 4.
Ethopolys Chamberlin.

Among other characters presented by Eupolybothrus it may be mentioned that the gonopods of the male are biarticulate as in Ethopolys; that no diastema is present on the prosternum; and that in most the claw of the gonopods of the female is entire and the basal spines 2 + 2; margin of head discontinuous as in Ethopolys. Examination of European species not accessible may reveal other genera. The genus has not been found in America.

The North American species of the Ethopolidae with the single exception of *B. multidentatus* (Newport) are found in the region west of the Rocky Mountains. In this western region they occur abundantly from Mexico to Alaska and in most parts of this territory are the largest of the Lithobioidea. East of the Rocky Mountains, and particularly in the southeastern states, the Ethopolidae are replaced by the large species of Lithobius proper which are comparatively rare, or in many parts wholly absent from, the western states.

Bothropolys Wood (emend. auct.).

Journ. Acad. nat. sci. Phil., 1863, new ser., **5**, p. 15. Trans. Amer. philos. soc., 1865, **13**, p. 152. Verhoeff, Bronn's Thierreich, 1907, **5**, p. 24. Chamberlin, Can. ent., 1912, **44**, p. 173.

Polybothrus Latzel, Myr. Österreich.-Ungar. monarch., 1880, **1**, p. 35.

Marginal thickening of head continuous forward to eyes, not interrupted or broken at sides (Plate **1**, fig. 1).

Antennae short, mostly not reaching caudad of the seventh segment;

composed of twenty articles, or occasionally of as many as twenty-four.

Prosternal spine well chitinized, situated at or near each anterior angle ectad of all the teeth, the latter being more or less uniformly spaced with no diastema separating them into two groups on each side (Plate **2**, fig. 2, 3).

Claw of anal legs single; that of the penult legs either single or with a single accessory claw minute or obsolete. Ventral spines of anal legs normally 1, 1, 3, 2, 1.

Coxae of last two pairs of legs each bearing a stout ventral spine as well as being armed laterally and dorsally.

Gonopods of male uniarticulate.

Gonopods of female with the claw tripartite, the lateral divisions being situated but little proximad of the median, the three often on a level or nearly so; basal spines 2 + 2, or, occasionally, 2 + 3.

TYPE.— *Bothropolys multidentatus* (Newport).

In the species of this genus there is particularly well marked on each side of the head a semicircular submarginal impression (line of muscle attachment), the anterior end of which is near the eye, the caudal end curving mesad and appearing as a short transverse sulcus at about one third the length from the caudal margin.

There is but little variation in the spining of the legs from species to species within the genus. The dorsal spines of the anal legs are uniformly 1, 0, 3, 1, 0; the ventral 1, 1, 3, 2, 1, rarely increased to 1, 1, 3, 3, 2 or falling to 1, 1, 3, 2, 0 on one side; claw single or with a slight point representing an accessory claw. Dorsal spines of the penult legs 1, 0, 3, 1, 1; ventral, 1, 1, 3, 3, 1, rarely 1, 1, 3, 3, 2; claw one, or with a single accessory claw. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 to 1, 0, 3, 2, 2; ventral uniformly 0, 1, 3, 3, 2. Dorsal spines of twelfth legs 1, 0, 3, 1, 1 to 1, 0, 3, 2, 2; ventral always 0, 1, 3, 3, 2. Dorsal spines of eleventh legs 0, 0, 3, 2, 2 or 1, 0, 3, 2, 2; ventral 0, 0, 3, 3, 2 or 0, 0, 2, 3, 2. Dorsal spines of first and second legs 0, 0, 3, 2, 1 or 0, 0, 3, 2, 2; ventral always 0, 0, 2, 3, 2.

The prosternal spine in the immature stages is attenuated and distally slender and bristle-like (Plate **2**, fig. 3); but in the great majority of specimens, the slender apical portion is lost in the adult, leaving the spine blunt at tip and proportionately short (Plate **1**, fig. 6, 7 and Plate **2**, fig. 2).

In variations in the claw of the female gonopods resulting in partial or complete obliteration of teeth or lobes, the result is due to an apparent filling in of the short incisions normally present between the teeth.

This gives a distally broad, subtruncate claw (Plate **2**, fig. 7; Plate **3**, fig. 1); *cf.* further under Ethopolys.

In the known species of the genus as here restricted, the posterior angles of the ninth, eleventh, and thirteenth dorsal plates, or of those together with those of the sixth and seventh, are produced. However, in Bothropolys as conceived by Verhoeff, there is greater variation in this respect, species with the angles of more of the dorsal plates or with those of the fourth, sixth, seventh, ninth, eleventh, thirteenth, and fourteenth, produced being also included. Verhoeff (Bronn's Thierreich, 1907, **5**, p. 240) proposes a purely artificial division of the genus, which he attributes to the North American and Oriental regions, as follows:—

α). Tergite ohne Fortsätze am Hinterrande. Coxosternum der Kieferfüsse mit 6 + 6 Zähnchen. 7–9 Ocellen jederseits.
Probothropolys n. subg.

β). 9., 11., 13. Tergit hinten mit Fortsätzen. Coxosternum der Kieferfüsse mit 7 + 7 bis 10 + 10 Zähnchen. 10–21 Ocellen jederseits.
Allobothropolys n. subg.

γ). 6., 7., 9., 11., 13. Tergit hinten mit Fortsätzen. Coxosternum der Kieferfüsse mit 6 + 6 bis 9 + 9 Zähnchen. 19–35 Ozellen jederseits.
Eubothropolys n. subg.

δ). 4., 6., 7., 9., 11., 13. und 14. Tergit hinten mit Fortsätzen. Coxosternum der Kieferfüsse mit 7–8 Zähnchen. Ocellen ca. 30 jederseits.
Telobothropolys n. subg.

Of the characters used in this key, those drawn from the prosternal teeth and eyes are, as given, wholly worthless since not even the species can be separated by them. This leaves only the one character of the angulation of the dorsal plates, the exclusive use of which gives an artificial grouping, species of really different genera, *e.g.*, of Bothropolys *sens. str.* and Ethopolys being brought together and at the same time separated from others truly congeneric with them. It will be seen that Verhoeff ignores the rule that the subgenus containing the type of the genus must bear the name of the latter. However, under any conditions, his subgeneric names have no standing, since he lists no species under any of them. Because of their composite character it would be difficult to apply them with any certainty; and it therefore seems the only course open is to regard them as *nomina nuda* in accord with a strict application of the rules of nomenclature. Of the two groups into which the North American species of Bothropolys as here restricted fall, Bothropolys *sens. str.* must be applied to that containing *B. multidentatus* (Newport), while the second may stand as Poropolys, subgen. nov., with *B. permundus* Chamberlin as its type.

Key to Species of Bothropolys.

a. Posterior angles of the sixth and seventh dorsal plates not produced. *Poropolys*, subgen. nov.

b. Ninth dorsal plate with the posterior angles only very slightly produced, those of eleventh and thirteenth with processes small. Body near 9.5 times longer than width of tenth plate. *B. victorianus*, sp. nov.

bb. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced. Body mostly from 7 to 8, or but little more, times as long as width of the tenth plate.

c. First dorsal plate of the male as wide as the eighth and as wide as or mostly a little wider than the tenth; ocelli 27 to 37 in mostly 5 series; length of *maturus* from 23 to 40 mm. . . *B. hoples* Brolemann.

cc. First dorsal plate of the male distinctly narrower than the eighth and tenth plates; ocelli 15 to 25, mostly in 3 or 4 series; length of *maturus* 19 to 27 mm. . . . . *B. permundus* Chamberlin.

aa. Posterior angles of the sixth, seventh, ninth, and eleventh dorsal plates produced. . . . . *Bothropolys sens. str.*

b. Head wider than long; prosternum about 1.8 times wider than long; body not more than eight times longer than the width of the tenth plate. . . . . *B. multidentatus* (Newport).

bb. Head as long as wide or slightly longer; prosternum between 1.5 and 1.6 times wider than long; body nearly nine times longer than the width of the tenth plate. . . . . *B. columbiensis*, sp. nov.

Bothropolys sens. str.

Bothropolys multidentatus (Newport).

Plate **1**, fig. 1–8.

Lithobius multidentatus Newport, Trans. Linn. soc. London, 1845, **19**, p. 365. Gervais, Hist. nat. ins. Aptères, 1847, **4**, p. 236. Newport, Cat. Myr., 1856, p. 17. Chamberlin, Ann. Ent. soc. Amer., 1909, **2**, p. 190.

Bothropolys nobilis Wood, Journ. Acad. nat. sci. Phil., 1863, new ser. **5**, p. 15.

Bothropolys multidentatus Wood, Trans. Amer. philos. soc., 1865, new ser., 1865, **13**, p. 152. Chamberlin, Can. ent., 1911, **43**, p. 98. Ann. Ent. soc. Amer., 1911, **4**, p. 48. Can. ent., 1914, **46**, p. 301. Psyche, 1918, **25**, p. 24.

Lithobius (*Eulithobius*) *multidentatus* Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 3, p. 10, 26. Bollman, Proc. U. S. N. M., 1887, **10**, p. 263.

Description.— Dorsum varying from light yellowish brown, with the first and last several segments often darker, through chestnut to

Fig. 1.—Distribution of Bothropolys Wood.

deep mahogany in specimens in full color. The head varies from reddish brown or chestnut to almost black. Venter but little paler than dorsum. Legs like venter, but tarsi distinctly paler, in the last pair, especially, usually distally rufous with the tibia also often affected.

Antennae mostly concolorous with head, distinctly rufous distally. Prosternum a little paler than head, the prehensorial feet paler, in darker specimens rufous especially ectally and distally.

Body attenuated caudad, but only slightly so cephalad, the sides being nearly parallel from the head to the tenth plate. Body from seven to eight times longer than the width of the tenth plate.

Head much wider than long, the ratio usually near 7:6.5; widest just caudad of eyes, the sides from these first running nearly parallel, converging but slightly, and these over the caudal third of length converging a little more strongly to the rounded caudal corners; caudal margin mesally nearly straight, curving forwards on each side. Moderately roughened.

Ocelli arranged in an elongate area in which mostly five to seven, often irregular, series can be detected, from twenty-five to forty in number; *e.g.*, 1 + 4, 6, 7, 6, 5, 4; 1 + 4, 5, 6, 6, 5, 4. Single ocellus large, subcircular.

Antennae short, usually reaching to about the middle of the seventh segment. Articles typically twenty, varying also, on the one hand, to nineteen, and, on the other, to twenty-three or twenty-four; all articles long and differing slightly in proportions, or, sometimes, a number of those immediately preceding the ultimate shortened, the ultimate usually long and slender but also sometimes shortened. Articles densely clothed with moderately long hairs, less densely so proximad.

The prosternum mostly near 1.8 times wider than long, being thus unusually wide. Mesal incision rather deep, its sides subparallel, rounded at bottom. Teeth uniform in size and spacing, mostly from 7 + 7 to 9 + 9 in number. Spine stout, in younger specimens always drawn out to a slender acute apical portion, but in older ones this slender apical portion is commonly lost, leaving the spine blunt distally and proportionately short (Plate **1**, fig. 7). The form of the spine in younger specimens or occasionally even in large adults is shown (Plate **1**, figs. 8).

Dorsal plates not much roughened, the caudal ones more so than the anterior. The usual submarginal transverse sulcus on the third, fifth, seventh, eighth, tenth, twelfth, and fourteenth plates extending from margin mesad or somewhat obliquely mesocephalad a little back of middle of length. Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced, the processes of the sixth sometimes evenly rounded distad rather than acute, and the inner side of those of the seventh sometimes long, the angulation of these two plates varying considerably.

Typically the first ventral plate is broadly mesally depressed; the other plates show three impressions, a median and a lateral on each side, the latter usually farther cephalad and often replaced by a pair of impressions of which one lies caudad of the other; there these impressions in some specimens pit-like, with the median one tending to elongate transversely on the anterior plates and longitudinally on the posterior ones; often all three impressions take on the character of longitudinal furrows, of which the median one is especially conspicuous on the more caudal segments. In the male the lateral furrows on the fourteenth plate converge caudad and are united by a transverse impression immediately in front of the smooth caudal portion, but the median furrow often causes this impression and extends to or nearly to the caudal margin; the lateral furrows on the fifteenth plate also united transversely but less converging than those of the fourteenth; the smooth pilose border, especially laterally, less sharply defined than in Ethopolys and the last two plates less abruptly differentiated from those preceding it. In the female the lateral furrows of the fourteenth and fifteenth plates are either not evident or weakly impressed, and more widely separated and less converging than in the male; but a transverse impression is sometimes conspicuously developed. Posterior plates in male shortly subdensely pilose especially on borders of last two; less as in the female.

Coxal pores numerous, arranged in three to five series, which are commonly irregular. Pores mostly small, increasing in size as usual from most anterior series to those of most posterior in which they are of moderate size and often elliptical in shape.

Spines of first and second legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third to ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth and eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 2}$, or $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$, the first formula being commonest; of the thirteenth the same as of the twelfth excepting that the ventral spines may be 0, 1, 3, 3, 1; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 1}$, rarely $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 2}$, the claw armed with a very small accessory claw; of the anal legs, $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 1}$, rarely to $\frac{1, 0, 3, 1, 0}{1, 1, 3, 3, 2}$, the claw single or else with an accessory claw represented by a minute or obsolete point. Last two pairs of coxae laterally armed.

Anal legs in female slender, rather short. In the male they are somewhat thicker; tibia a little clavately thickened distad and at the distal end the dorsal surface is raised into a slight rounded elevation which is more densely pilose: the first tarsal joint is also similarly more densely pilose on the dorsal surface at the distal end than elsewhere and sometimes is weakly clavate. The femur somewhat thicker than in the female and also clavately widened distad.

Gonopods of female with claw but moderately bent; the two lateral lobes but little proximad of level of median; occasionally one of the lateral lobes may be replaced by two so that there are four divisions instead of the usual three. The outer of each pair of spines considerably larger than the inner and often bifid distally; spines subcylindric with acuminate distal portion short and commonly blunt; the inner spine may be bent mesad at tip.

For appearance of gonopods of male, see Plate 1, fig. 2.

Length 15 to 27 mm. The antenna in specimens from 24 to 26 mm. long is from 11 to 12 mm. long, the anal legs exclusive of coxa being from 9 to 11 mm. long. A ♀ 26 mm. long has the tenth (and eighth) dorsal plate 3.3 mm. wide; a ♂ 19 mm. long has the tenth (and eighth) dorsal plate 2.8 mm. wide.

Immaturus.— Light brown in life, often having something of a violaceous tinge. Head light reddish brown or chestnut. Antennae and last pair of legs pale, yellowish distad.

Antennae with the twenty articles present, of nearly same proportions as in adult.

Eyes composed of seventeen to nineteen ocelli in 4 series; *e.g.*, 1 + 5, 5, 4, 2.

Prosternal teeth 6 + 6. Spines slender and pale. Chitinous lines distinct, complete or nearly so.

Three joints of female gonopods present, the claw indicated merely as a chitinous point to the distal joint. Second joint with two or three bristles, the first with from five to seven, the last with one or two. Coxal pores small, mostly in but two series, those of caudal row largest, six to twelve in number.

Spines of first legs, $\frac{0,\ 0,\ 2,\ 1,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; spines of second legs, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2\ (1),\ 3,\ 1}$; of third to seventh, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 1}$; of eighth to tenth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3\ (2),\ 3,\ 2}$; of the twelfth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{1,\ 1,\ 3,\ 2,\ 1}$. Ventral spines of last two pairs of coxae strongly developed as also the lateral and dorsal.

Length of specimen described, 12 mm.

Agenitalis (♂).— Light violet-brown. Head more reddish. Antennae and last legs paler, yellowish.

Prosternal teeth 5 + 5. Spines pale, slender.

Ocelli about eight in two series; *e.g.*, 1 + 4, 3.

The twenty articles of antennae already present, varying in length, the shorter ones occurring at intervals.

Angles of dorsal plates produced as in adults, but the processes of the sixth weaker.

Coxal pores on anal coxae two in one series; on others in two series, four or five in number, three of caudal or ventral row largest as usual.

Gonopods small, wart-like, glabrous.

Spines of first legs, $\frac{0,\,0,\,0,\,1,\,1}{0,\,0,\,1\,(0),\,1,\,0}$; of second, $\frac{0,\,0,\,1,\,1,\,1}{0,\,0,\,2,\,1,\,1}$; of third, $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,2,\,1,\,1}$; of fourth, $\frac{0,\,0,\,1,\,2,\,1}{0,\,0,\,2,\,2,\,1}$; of fifth to ninth, $\frac{0,\,0,\,2,\,2,\,1}{0,\,0,\,2,\,2,\,1}$; of tenth and eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,2,\,1}$; of twelfth, $\frac{0,\,0,\,1,\,3,\,1,\,1}{0,\,1,\,2,\,2,\,1}$; of thirteenth, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,1,\,2,\,1}$; of fourteenth, $\frac{1,\,0,\,3,\,1,\,1}{1,\,1,\,3,\,2,\,0}$; of anal, $\frac{1,\,0,\,3,\,1\,(0),\,0}{1,\,1,\,3,\,2,\,0}$.

Length of specimen described *cir.* 9 mm.

Type Locality.— New York.

Known Localities.— Massachusetts (Warwick!). New Hampshire (Marlow). New York (Ithaca! Penn Yan! Albany! Thousand Is.!). Ohio (Columbus! Kelly's Island!). Indiana (abundant throughout the state). Michigan (Ludington, Ann Arbor! Lansing! Douglas Lake!). Illinois (Franklin Grove! Peoria!). Pennsylvania (Philadelphia!). New Jersey!. District of Columbia (Washington!). Maryland. Delaware. Kentucky (near Mammoth Cave! Osceola! Greensburg!). Tennessee (Beaver Creek, Mossy Creek, Nashville! Knoxville! Russellville!). Virginia (Machaville, Natural Bridge! Chatham! Balcony Falls!). West Virginia (White Sulphur!). North Carolina (Catawba! Chapel Hill! Morgantown!). South Carolina. Georgia!. Florida (Palatka!). Alabama (Maplesville! Jackson!). Mississippi (Canton! Fernwood! Byram!). Arkansas (Little Rock!). Louisiana!.

In this widespread species, considerable variation occurs. Variation in the spining of the legs is apparently more frequent than in related species, as noted particularly on the twelfth and thirteenth pairs where an extra or caudal spine occurs on the fourth or on the fourth and fifth articles raising the dorsal formula to 1, 0, 3, 2, 1 or 1, 0, 3, 2, 2 in place of the typical and much more frequent 1, 0, 3, 1, 1. Specimens collected at Franklin Grove, Ill., have a considerably larger proportion with the increased number of spines on these legs than in those from other localities studied, this variation in most places appearing to be rare.

Bothropolys columbiensis, sp. nov.

Description.— Dorsum brown, with the caudal plates light ferruginous. Head also of pale ferruginous cast with the frontal region lightest. Antennae pale brown, lightest distally. Prosternum pale ferruginous, with the prehensors lighter, more yellowish. Venter brown, the caudal plates light ferruginous. Legs yellowish brown, brighter distad; caudal pairs light ferruginous.

Body rather slender, being nearly nine times longer than the width of the tenth plate. Ratio of width of head to that of first, third, eighth, and tenth dorsal plates as 44 : 40 : 39 : 44 : 44.

Head slightly longer than wide (45 : 44); widest immediately caudad of the eye, the sides incurved at level of suture and then moderately converging caudad to the well-rounded corners. Caudal margin straight or nearly so. On caudal region a narrowly V-shaped impression with the apex caudad and more or less extended as a median sulcus; ectad of each arm of the V-shaped impression are two or three longitudinal sulci. A V-shaped impression on frontal portion of head with the point a little in front of suture and the arms diverging cephalad. A weaker transverse constriction extending straight across frontal region from near lateral ends of frontal suture.

Eyes composed of sixteen ocelli in three series: thus, 1 + 6, 5, 4. The single ocellus not very large. Ocelli well spaced, regular, decreasing in size cephalad and ventrad as usual.

Antennae short, reaching to the seventh segment. Articles twenty, moderate in size and uniform.

Prosternum in type 1.54+ times wider than long. Distance between chitinous spots 1.9 times width at mesal incision, 2.53 times the dental line. Mesal incision moderate V-shaped, with the sides somewhat flaring. Teeth of moderate size, nearly uniform, the outer ones a little larger and a little more widely spaced; 6 + 6 in number. Spine moderately stout at base a little above which it is constricted then running out into a fine bristle-like distal portion.

First dorsal plate widest at anterior end with the sides moderately converging to the rounded caudal corners; 1.8 times wider than long; with two pairs of longitudinal furrows ending about one third the length of plate from caudal margin; a weak transverse furrow near caudal ends of longitudinal ones. Other plates mostly with two submedian longitudinal sulci and each side of these two deeper furrows which converge caudad and commonly meet at an acute angle. Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced, but those of the sixth only weakly so, those of the seventh more distinct but with the mesal edge long.

Coxal pores in three or four series of which the most caudal is longest and composed of largest pores as usual.

Spines of first and second legs, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,2}$; of third to ninth inclusive, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of tenth and eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the twelfth, $\frac{1\,(0),\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,2}$; of the thirteenth, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,2}$; of the penult, $\frac{1,\,0,\,3,\,1,\,1}{1,\,1,\,3,\,3,\,1}$, a very small accessory claw present; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{1,\,1,\,3,\,2,\,1}$, the claw single. Last two pairs of coxae laterally armed.

Anal legs in female of moderate length, slender, dorsally longitudinally sulcate.

Claw of female gonopods tripartite as usual, the lobes of usual relations. Basal spines conical, somewhat rounded at tips.

Length 15 mm.; length of antennae 6.6 mm.; of anal legs 6 mm.; width of tenth plate, 1.68 mm.

Locality.— British Columbia (Kaslo!).

The type (M. C. Z. 672) is a female in the late *pseudomaturus* stage.

This species is very close to *multidentatus* (Newport) but differs especially in proportion of body, head, and prosternum. The head is longer than wide whereas in the other species it is conspicuously wider than long; and the prosternum is but 1.54 times wider than long as against 1.8 times in *multidentatus*. The coloration of the two species is different.

Poropolys, subgen. nov.

Bothropolys hoples (Brolemann).

Plate **2**, fig. 9. Plate **3**, fig. 1–4.

Lithobius (*Bothropolys*) *hoples* Brolemann, Ann. Soc. ent. France, 1896, **65**, p. 45.
Lithobius hoples Chamberlin, Ann. Ent. soc. Amer., 1909, **2**, p. 191.
Bothropolys hoples Chamberlin, Can. ent., 1912, **44**, p. 173.

Description.— Dorsum from brown, with the head and the first and last segments reddish, to light chestnut in specimens in full color, the head being then not at all or but little darker. A median longitudinal stripe with on most of the major plates one or two fainter somewhat oblique marks each side of it testaceous, these light lines extending about two thirds the length of the plate; caudal borders and minor plates often also testaceous. Antennae brown to light chestnut proximally, becoming yellow distad. Prosternum and prehensorial feet colored like the head. Venter and legs testaceous, the last segments darker, often chestnut, the anal pair of legs also darker, in fully colored specimens light chestnut.

Robust, being from 7 to 8.25 times longer than width of tenth plate. The first dorsal plate in the male is as wide as or mostly a little wider than the eighth and tenth, but in the female it is always distinctly narrower; the ratio of width of first, eighth, tenth, and twelfth plates is typically near 68 : 67 : 67 : 64 in the male, and 64 : 68 : 68 : 66 in the female.

The head is wider than long in about the ratio 5 : 4.5. Sides nearly straight from immediately back of the eyes to the rounded caudal corners, slightly converging; caudal margin straight between the rounded corners or mesally very weakly incurved. A short, deep, curved mark running mesocaudad from each margin at about one third the distance from the caudal corner and a slightly curved and mostly suboval furrow or pit on each side immediately in front of the caudal margin. There is a faint impression a little caudad of and parallel with the frontal suture, the space between it and the suture free or nearly free of puncta. Lightly, and not densely punctate.

Ocelli in an elongate patch, black, uniform, and compactly arranged. Ocelli from twenty-seven to thirty-seven, arranged in five series; *e.g.*, 1 + 8, 9, 7, 7, 5; 1 + 5, 7, 6, 5, 4; 1 + 6, 7, 6, 4, 3; 1 + 7, 7, 4, 3; 1 + 7, 8, 6, 5, 3; 1 + 6, 7, 6, 5, 4.

Antennae short, reaching the sixth segment or sometimes the seventh. Composed of twenty to twenty-three rather long articles which do not vary much in their proportions. Clothed with relatively short hairs.

Prosternum with chitinous lines indistinct or absent caudad. Near 1.6 times wider than long. Mesal incision narrow, the sides weakly inclined. Distance between chitinous spots about 2.5 times the dental line and two times the width at bottom of mesal incision. Teeth 8 + 8 to 10 + 10, often with different number on the two sides, as in other species, as 8 + 9, 8 + 10, etc., outer teeth on each side a little wider apart than the mesal ones. Spine attenuated to a bristle-like apical portion which is commonly dropped off from fully grown specimens, leaving the spine blunt.

The middle portion of the dorsal plates is nearly smooth, the lateral portions rugose. The first, third, fifth, eighth, tenth, twelfth, and often the fourteenth plates showing a distinct transverse or subtransverse sulcus adjacent to each lateral margin at about one third the length from the caudal margin corresponding to the one on the head; the seventh is marked with a deeper curved furrow near each caudolateral corner and also with an impression near each cephalolateral corner. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced, the processes acute.

Entire surface of first ventral plate depressed concavely; the others nearly all showing three longitudinal and parallel impressions which are rather wide and shallow furrows of which the median is deeper than the others and is ordinarily of a subcircular outline and lies caudad of middle of plate; on the fourteenth and fifteenth plates the lateral

impressions, especially in the male, converge and caudally bend mesad and usually unite in a transverse furrow which the median impression also meets.

Spines of first to sixth pairs of legs, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the seventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$ to $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the eighth to tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth and thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 1}$, the accessory claw minute or absent; of the anal, $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 1}$, claw single. Last two pairs of coxae laterally armed.

Anal legs long and slender, the third article broadly furrowed longitudinally on the ventral surface. The third, fourth, fifth, and sixth articles longitudinally furrowed subdorsally, the furrow being most distinct on the fourth and fifth articles at distal ends and being faint on the sixth. A ventral furrow on the third joint is present also in the penult legs but it is less marked than in the anal. Legs of male not specially modified.

Gonopods of male appearing as rounded projections of moderate size bearing seven or eight bristles.

Claw of gonopods of female moderately short, tripartite, the three teeth not much differing in size. Outer of each pair of spines larger than the inner; spines thickest at base, moderately and uniformly converging to the short acuminate apical portion (Plate **2**, fig. 9; Plate **3**, fig. 1–3).

Length from 20 to 40 mm. In a male 40 mm. in length the antennae are 17.5 mm. long; anal legs 16 mm. long; width of first dorsal plate 5.1 mm.; of eighth and tenth 5 mm.; of twelfth 4.5 mm.

Pseudomaturus.— Coloration similar to that of adult but somewhat paler throughout.

Ocelli near twenty-one in four series; 1 + 6, 6, 5, 3 (2); 1 + 7, 5, 5, 3 (2).

Antennae as in *maturus*.

Prosternal teeth 7 + 7.

Spining of legs as in *maturus*.

Coxal pores mostly fifteen to twenty in three series or with a fourth series unevenly developed.

Gonopods in female with claw a little thinner than in *maturus* and hairs somewhat fewer. Spines of the characteristic shape but the inner one of each pair proportionately more slender and somewhat shorter.

Length 16–18 mm. (Kaslo, British Columbia).

Praematurus.— Coloration uncertain because of long preservation.

Eyes consisting of about sixteen ocelli in three or four series; *e.g.*, 1 + 6, 5, 3, 1; 1 + 6, 4, 3, 2.

Antennae composed of the full twenty articles which are mostly uniform and relatively somewhat shorter than in the adult.

Prosternal teeth 7 + 7. Spine stout at base, running out to a bristle-like apical portion.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,2,3,1}$; of the second $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the third to ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult $\frac{}{1,1,3,3,1}$; of the anal, $1,1,\overline{3,2\,(3),2}$.

Coxal pores in two or three series, ten to fifteen in number, those of most anterior row commonly very small.

Claw of female gonopods very short and pale; but slightly bent; tripartite, the lateral teeth weak and much shorter than the acute median division. Basal spines 2 + 2, but the inner one of each pair much more slender than the stout conical outer one and only about half as long.

Length *cir.* 15 mm.; length of antennae 7 mm.; of anal leg *cir.* 6.5 mm.

Type Locality.— Washington.

Known Localities.— Washington. Oregon (Portland!). British Columbia (Kaslo!). Montana (Flathead Lake!). Idaho (Kootenai Co.!).

This large species is common in the Northwest. The marked sexual dimorphism shown in the proportions of the body is very interesting and is not paralleled in any other known North American species either of Bothropolys or of Ethopolys.

As indicating the extent to which the antennae may occasionally vary, it may be mentioned that in a specimen from Idaho the left antenna reaches only to the fifth segment, while the right one extends to the eighth segment, the number of articles, nevertheless, being the same on the two sides.

Bothropolys permundus (Chamberlin).

Plate **2**, fig. 1–8.

Lithobius permundus Chamberlin, Proc. Acad. nat. sci. Phil., 1902, p. 42.
Lithobius xanti Chamberlin (*ex parte*), Proc. U. S. N. M., 1901, **24**, p. 24.
Bothropolys permundus Chamberlin, Can. ent., 1912, **44**, p. 173.

Description.— Dorsum brown, the head with the last few and also often the first or first few dorsal plates rust-brown or ferruginous; middle portion of dorsum sometimes very dark, dusky, and part of the plate often with a median longitudinal blackish stripe with some-

times, especially on the more caudal plates, a pale oblique line on each side. Legs brown to testaceous, the tarsi, as usual, more brightly colored, light orange; last pairs of legs light orange in color. Antennae brown to orange, usually lighter distad. Venter brown, with the last several plates ferruginous. Prosternum and prehensorial feet pale ferruginous.

Body from 7.6 to 8 times longer than the width of the tenth plate. Widest as usual at eighth and tenth plates; narrowed conspicuously caudad and but little cephalad; the first plate in both male and female clearly narrower than the eighth and tenth. The width of first, eighth, tenth, and twelfth plates in a male are to each other as 58 : 63 : 63 : 60; in a female as 61 : 62 : 62 : 62, the female being more uniform.

Head wider than long in about ratio 13 : 12. Of usual shape; sides converging considerably from immediately back of eyes caudad. A rather sharply impressed curved furrow a little caudad of and parallel with the frontal suture, this furrow not extending over the lateral portions of head. The usual short transverse furrow over each lateral border at beginning of caudal third of length. Head polished, the puncta few and scattered.

Eyes composed of fifteen to twenty-five ocelli in three to five series. Single ocellus of moderate size, subcircular, typically contiguous with first one of dorsal row. Seriate ocelli small, compactly grouped. Examples of arrangements are 1 + 6, 5, 3; 1 + 5, 5, 4, 3; and 1 +6, 5, 4, 3.

Antennae usually reaching to the seventh segment. Composed of from twenty to twenty-three articles, all of which are moderately long and do not vary much among themselves in proportions. Hairs moderately long.

Prosternum near 1.6 times wider than long. Chitinous lines very faint. Mesal incision with sides considerably converging, the sinus at bottom narrowly rounded. Teeth nearly uniform in size and spacing, or the outer ones more widely separated than the inner. Teeth 7 + 7 to 9 + 9. Spine of usual acuminate form, the bristle-like tip commonly lost in adults leaving the basal portion bluntly tipped.

Dorsal plates polished, not rugose being roughened only by the furrows mentioned below. The first, third, fifth, eighth, tenth, twelfth, and fourteenth plates with the usual short submarginal sulcus on each side near beginning of caudal third of length, the seventh with similar impressions at each caudal and each anterior corner. Each major plate excepting the first or the first and third with a median and on

each side a lateral longitudinal furrow which are least distinct on the anterior plates; often also an oblique furrow on each side running from near the anterior end of median furrow ectocaudad and meeting the outer longitudinal furrow at an angle. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced, those of sixth and seventh obliquely truncate or excised.

Ventral plates with the usual three longitudinal furrows which increase in distinctness from anterior to posterior regions and may be almost obliterated on first plates; the median impression on the more anterior segments is often pit-like; a transverse furrow a little in front of caudal margin may or may not be evident. Typically in the male the three furrows on the last three plates extend distinctly across the plate, the two lateral converging and meeting upon the median one in an acute angle in front of the caudal end of the latter or else connected across it by a transverse furrow.

Coxal pores varying in size as usual with those of the most caudal series and at the distal end largest; arranged in three or four series and mostly from twelve to twenty-seven in number on each coxa.

Spines of first to fifth legs, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of sixth and seventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2\,(3),\,3,\,2}$; of the eighth and ninth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the tenth, $\frac{1\,(0)\,0,\,3,\,2,\,2}{0,\,0,\,3,\,2,\,2}$; of the eleventh, $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$ or $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$; of the twelfth and thirteenth, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,2}$ or $\frac{1,\,0,\,3,\,1,\,2}{0,\,1,\,3,\,3,\,2}$; of the penult, $\frac{1,\,0,\,3,\,1,\,1}{1,\,1,\,3,\,3,\,1}$, with one small accessory claw; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{1,\,1,\,3,\,2,\,1}$, claw 1. Last two pairs of coxae laterally armed.

In the female the anal legs are of medium length and slender. In the male the fourth, fifth, and sixth articles are somewhat more thickened, the sixth or first tarsal joint being commonly conspicuously thicker than the seventh joint; the fourth and fifth joints are slightly complanate above and more densely clothed with the fine short hairs on dorsal side toward distal end.

Gonopods of male consisting of one subcylindric, distally rounded or sometimes obliquely subtruncate article which bears seven or eight bristles.

Claw of female gonopods of moderate length, not strongly curved, tripartite, with the lobes nearly equal in length and form. Basal spines subuniformly acuminate from very base the apical portion longer and more slender and more acute than usual. Outer spine largest (Plate **2**, fig. 8).

Length from 19 to 27 mm. In a female 20 mm. long the antennae are 9.8 mm. long; the anal legs, exclusive of coxa, 8 mm.; width of first dorsal plate 2.4 mm.; of the tenth plate 2.6 mm.

Pseudomaturus. — Dorsum brown with margins of major plates often

darkened; head and caudal segments light ferruginous, the former somewhat dusky caudad of the frontal suture. Antennae brownish or somewhat ferruginous proximally, yellowish distad. Prehensorial feet pale orange, the prosternum a little darker. Venter light brown, the last few segments subferruginous. Legs light brown, pale orange at tips. Last pair of legs light orange excepting proximad.

Ocelli fewer in number than in *maturus* but of same proportion and arrangements such as 1 + 5, 5, 4.

Antennae composed of twenty to twenty-two articles; when of the larger number some of the more distal articles short, apparently from subdivision of larger articles; when twenty moderately long and decreasing in length distad from the second to the penult.

Prosternal teeth mostly 6 + 6. Spine as in adult, but tip more usually present. Chitinous lines distinct.

Coxal pores eight to fourteen in two or three series, the more cephalic ones very small or some minute.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second to the seventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eighth and ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the tenth and eleventh, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 1, 2}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 1}$.

Gonopods of female nearly as in adult, but claw less strongly chitinized; of about equal width distad and proximad; teeth appearing as crenations of about same length, but middle one broader. Spines nearly as in adult but the inner proportionately to the outer one a little more reduced.

Length 14 to 17 mm. long. A female 15.5 mm. long has antennae 6.5 mm. long, and anal legs 7 mm. long.

Praematurus.— Light brown commonly of more or less violaceous tinge, head light ferruginous, the caudal segments more yellowish. Prosternum and prehensorial feet and the most caudal ventral plates yellowish or weak orange tinge. Antennae yellow distad. Legs pale, the caudal pairs yellow or yellowish orange.

Ocelli 1 + 5, 3, 2; 1 + 5, 4, 2. Compact, the single one contiguous, not much different in size.

Articles of antennae already twenty, a little shorter than in adult.

Prosternal teeth 5 + 5, uniformly spaced, lips narrowly rounded, black. Spine long, bristle-like at tip. Chitinous lines very distinct.

Coxal pores in two rows, those of the anterior one often relatively very small or minute, the distal pore of the caudal row being much the largest.

Spines of first and second legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; spines of third to eighth

pairs, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of ninth to eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, and thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$.

Gonopods of male appearing as pale rounded processes bearing two or three bristles.

Claw of female gonopods brown, short and thin; the middle lobe clearly longer than the lateral ones, acute; the lateral teeth small, acute, and toward base of claw. Basal spines 2 + 2, with the inner one of each pair much shorter and more slender than the outer.

Length of a female 14 mm., with anal legs 5.5 mm., and antenna 4 mm. long. A male is 12 mm. long.

Immaturus.— Pale brown, frequently with a strong violaceous tinge showing through from beneath. Head and last segments above and beneath rust-yellow or light orange. Last pairs of legs yellowish.

Ocelli 1 + 5, 4 to 1 + 5, 4, and 1 + 5, 4, 2 or 1 + 5, 3, 1; the anterior ones pale, whitish.

Prosternal teeth 4 + 5 or 5 + 5; the outermost on each side largest. Spine slender, bristle tipped. Chitinous lines strongly evident.

Articles of antennae twenty, shorter than in the adult; often in part somewhat moniliform.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates already strongly produced.

Coxal pores mostly in a single series, but sometimes with one or two in a second more anterior row; small, margins pale; from four to seven on each coxa.

Spines of first legs, $\frac{0,0,3\ (2),2,1}{0,0,2,2,1}$; of the second, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the third to fifth, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or sometimes, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the sixth and seventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eighth and ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{1,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{0,0,3,2,2}{0,0,3,3,2}$ or $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the eleventh, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the twelfth and thirteenth $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,1}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$.

In the gonopods of the female the three joints are distinct. The distal article short and apically more or less rounded, the claw being either not evident or else indicated merely as a minute point. The first article with three or four bristles, the second with two and the third with one on the ventral surface. Basal spines 1 + 1, very small, acutely conical, pale.

Length 8.5 to 11 mm. A specimen *cir.* 9.8 mm. long has antennae 3.7 mm. and anal legs 4 mm. long.

Agenitalis.— Very pale yellowish, conspicuously violaceous. Head brighter yellow, in front of suture. Anal legs whitish at distal ends.

Ocelli 1 + 3, 2; well separated from each other; pale. Single ocellus but slightly larger than the adjacent one. Organ of Tomösvary

elliptical, with outline as large as an ocellus; situated cephaloventrad of anterior eye of ventral row.

Articles of antennae twenty, shorter than in the older stages, submoniliform.

Prosternal teeth 5 + 5; small, the innermost smaller than the others; but little darkened at tips. Spine slender, bristle-like above base. Chitinous lines indistinct.

Coxal pores pale and small, increasing in size distad. In a single series; *e.g.*, 2, 3, 3, 2.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the second and third, $\frac{0,0,1,1,1}{0,0,0,1,1}$; of the fourth and fifth, $\frac{0,0,2,2,1}{0,0,0,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the sixth to the eleventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,2,1}$ or $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,2,2,1}$; of the penult, $\frac{1,0,2,1,1}{0,1,3,2,0}$ or $\frac{1,0,2,1,0}{0,1,3,2,0}$; of the anal, $\frac{1,0,2,0,0}{1,1,3,2,0}$.

Gonopods of the female biarticulate; the distal article conical. Each article with one bristle. The distal article may show trace of subdivision line for formation of the third article.

A specimen 7.5 mm. long has the anal legs *cir.* 3.5 mm. and the antenna *cir.* 4 mm. long.

Known Localities — Utah (canyons of the Wahsatch Mountains at lower and middle elevations throughout the range: the Weber! Farmington! City Creek! Mill Creek! Little and Big Cottonwood! American Fork! Provo! Spanish Fork! etc.).

In and about the more thickly populated districts this species tends to be wholly replaced by *Lithobius forficatus* (Linné). The species sometimes occurs in association with *E. xanti* (Wood).

This species is closely allied to *B. hoples* Brolemann; but aside from its smaller size and usually different color, the ocelli are fewer, being from 15 to 25 in number in three or four series whereas in *B. hoples* they are from twenty-seven to forty in mostly five series; the spines of the female gonopods are typically characteristically different as shown in the figures; and the male lacks the marked difference in proportions presented by that of *hoples*, the first dorsal plate being always distinctly narrower than the eighth and tenth.

Bothropolys victorianus, sp. nov.

Plate **3**, fig. 5, 6.

Description.— Brown, the caudal plates darker and of a ferruginous cast. Head paler over the frontal region. Antennae brown, yellow distally. Legs similar in color to corresponding dorsal plates.

Prosternum light brown of ferruginous tinge. Venter brown with the caudal plates more deeply pigmented, of ferruginous cast.

Body slender, in type being about 9.6 times longer than the width of the eighth plate. The first dorsal plate in the female type not much differing in width from the tenth plate.

Head wider than long in the ratio 63 : 61. Widest as usual immediately behind eyes from where the sides converge a little to the rounded caudal corners, a little bent in at level of suture but lateral margin unbroken. Caudal margin slightly incurved at middle. An impressed dot each side of the median line a little caudad of the frontal suture continuous with a fainter furrow extending ectocephalad from it. A small V-shaped impression in front of caudal margin and cephalad of each of its ends a short oblique furrow which indistinctly unites with its fellow also to form a V-shaped outline; there is also a short oblique impression ectad of each arm of the V-shaped mark. A median longitudinal furrow extends forward from the frontal suture.

Ocelli nineteen or twenty in four or five series; *e.g.*, 1 + 5, 5, 5, 3, 1 and 1 + 6, 5, 4, 3.

Antennae short, reaching only to the fifth segment. Composed of twenty articles which are moderately long and subclavate, not much varying among themselves in proportions. Hairs of medium length.

Prosternum between 1.5 and 1.6 times wider than long. Distance between chitinous lines twice the width at level of bottom of median sinus, 2.3+ times the dental line. Teeth 8 + 8, uniform, apically rounded. Spines a little longer than the teeth, stout basally, distally attenuated, bristle-like.

Posterior angles of eleventh and thirteenth dorsal plates distinctly produced, but the processes short; those of the ninth (Plate 3, fig. 5) but weakly and inconspicuously produced, the apex of the process scarcely extending caudad of median portion of the plate. Plates all strongly rugose over the median as well as the lateral portions. Most showing a median longitudinal furrow and a deeper, irregular, longitudinal furrow between the median one and the lateral edge on each side. The major plates with the usual submarginal transverse short sulci near beginning of the caudal third, each of these connecting with a furrow extending obliquely cephalomesad from its inner end.

First and second ventral plates broadly depressed as usual. Others with the three longitudinal impressions much as in *hoples*.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second to the sixth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the seventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eighth, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the ninth and tenth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 1, 2}{0, 0, 3, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth

and thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 2, 1}$, claw single; of the anal, $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 1}$ or $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 0}$, the claw single. Coxae of last two pairs of legs laterally armed. (Note.— The right penult leg of the type specimen has the ventral spines 1, 1, 3, 3, 1; but the lateral spines of the fourth joint are both on the cephalic side, one being thus clearly accessory and not to be reckoned in the normal formula).

The anal legs of the female are moderate in length and slender. The prefemur and femur are weakly longitudinally sulcate dorsally.

The claw of the female gonopods moderately wide; the lobes are acute, the middle one a little the largest, the apices of the lateral ones being but little proximad of that of the median one. Basal spines 2 + 2 or 3 + 2; not acuminate from base, narrowest near middle of length; apical portion very short (Plate 3, fig. 6).

Length 25 mm.; width of eighth plate 2.6 mm.; length of antenna, 10 mm.; of anal leg exclusive of coxa, 8.4 mm.

Pseudomaturus.— A little paler throughout than the *maturus*.

Ocelli fourteen in three series; thus, 1 + 6.4, 3.

Antennae as in *maturus* excepting that the ultimate article in specimen studied is proportionately considerably longer.

Prosternal teeth 6 + 6.

Coxal pores fewer than in *maturus;* in two or three series.

Spines of legs as in *maturus*.

Claw of female gonopods as in *maturus* excepting that it is a little more slender. Spines 2 + 2 with the inner one of each pair only about two thirds as long as the outer one and correspondingly more slender. Of same form as in the *maturus*.

Length 15.5 mm.; width of eighth plate 1.6 mm.; length of antennae 6.8 mm.

Type Locality.— British Columbia, Vancouver Island (Victoria).

Known Localities.— Vancouver Island (Victoria! J. E. Benedict coll.) Alaska (Forrester Island! Harold and Ronald Heath).

This species is allied to *B. permundus* and *B. hoples*, being apparently closest to the latter. So far as indicated by the type specimens (M. C. Z. 675) the species may be very readily distinguished through the character of the processes of the ninth, eleventh, and thirteenth dorsal plates, these being but weakly developed and those of the ninth in particular being almost obliterated. The spines of the female gonopods are of a different form. The species is also distinctly more slender and smaller than the characteristically robust *B. hoples* which is common in the neighboring parts of Washington and British Columbia. The specimens from Forrester Island agree fully with those from Victoria.

Zygethopolys, gen. nov.

Marginal thickening of head smoothly continuous forward to the eyes as in Bothropolys, not interrupted or broken at sides.

Antennae short, reaching seventh segment; articles twenty.

A diastema present in the dental line on each side of prosternum and separating the teeth into two groups. Spine situated in the diastema, well chitinized, stout at base.

Claw of anal legs single; that of the penult legs with a well-developed accessory claw. Ventral spines of anal legs 1, 1, 3, 3, 1.

Coxae of only the anal legs bearing a spine ventrally. Last two pairs of coxae armed laterally.

Gonopods of female with claw bipartite, the lobes equal. Basal spines 2 + 2.

Male unknown.

Type.— *Z. nothus*, sp. nov.

As the genus is known from only the female of a single species, it is not possible to speak with entire certainty as to its position other than to remark that it combines features of Bothropolys and Ethopolys with apparently more in common with the former, under which it might seem justifiable to range it as a subgenus. It is better and clearer, however, at present to keep the group apart. From Bothropolys it may be separated at once through the presence of the prosternal diastema. It is also different in having the spining of the anal legs ventrally 1, 1, 3, 3, 1 instead of the 1, 1, 3, 2, 1 (rarely 1, 1, 3, 3, 2) present in all species of Bothropolys, in lacking a ventral spine on the penult coxae, and in having the claw of the penult legs with a well-developed accessory spine or claw at base. The claw of the female gonopods is also characteristic in being bipartite with the lobes equal, it being tripartite in all known species of Bothropolys. The first dorsal plate also is narrower than the third, an interesting condition not noted in any other species of the Ethopolidae.

Outside of the Ethopolidae, the only genus of Lithobioidea known to the author to have a diastema in the prosternal dental line is Eremobius, a new genus typified by *Lithobius provocator* Pocock of the Bermuda Islands.

ZYGETHOPOLYS NOTHUS, sp. nov.

Plate 3, fig. 7, 8.

DESCRIPTION.— Dorsum brown, dusky toward edges, the first one and the last several plates a little darker, of slightly reddish or dilute chestnut cast. Head dilute chestnut, dusky especially in a median longitudinal band continuous anteriorly with a narrow curved transverse one a little back of and parallel with the frontal suture between which and the dark band there is a clear area. Antennae dark brown excepting the ultimate article which is abruptly brighter yellow in color. Legs light brown excepting the last two pairs, which are dark, the anal pair especially so but pale along mesal surface. Prosternum and prehensors testaceous. Venter light brown, excepting fourteenth and fifteenth sternites which are much darker, chestnut or dark reddish brown.

Body only about 6.5 times longer than the width of the tenth plate. First dorsal plate narrower than the head and the third plate, the latter distinctly narrower than the eighth and tenth plates. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 49 : 46 : 49 : 56 : 57 : 55.

Head wider than long in the ratio 49 : 46. A deeply impressed curved transverse sulcus between eyes and a little distance caudad of the suture, this sulcus consisting of three curved sulci united at ends, each with convexity cephalad. A short and deep semicircular or U-shaped transverse impression a little in front of the caudal marginal thickening. A median longitudinal furrow extending from frontal suture cephalad and bifurcating at anterior end. Surface not punctate.

Eye-patch oblong, composed of twenty-three ocelli arranged in four series: thus, 1 + 6, 6, 6, 4. Single ocellus circular, contiguous with seriate patch. Seriate ocelli more nearly uniform in size than usual, distinct, black.

Antennae short, reaching to the seventh segment. Articles twenty, of moderate size or short. Ultimate article a little longer than the two preceding taken together.

Prosternum 1.9 times wider than long. Distance between chitinous lines 1.9 times the dental line. Spine stout at base, narrowed to an acute point, inserted contiguously to margin. Teeth 2 − 6 + 6 − 2, the most ectal and the most mesal on each side smallest, the others nearly uniform in size. Mesal incision very narrow, acute.

Fig. 2.— Distribution of Zygethopolys nothus Chamberlin.

First dorsal plate 1.7 times wider than long. A characteristic semicircular impression having an end on the anterior margin at about two thirds the distance from the median line to the lateral margin. Other plates moderately and more or less uniformly roughened over the

entire surface, the major ones with the short submarginal transverse sulci found in other species of the tribe but without distinct longitudinal or oblique furrows; a semicircular impression like that of the first plate faintly indicated, this more distinct on the eighth and tenth plates, the impression on the tenth terminating on a second similar but more convex impression. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates produced strongly, others straight.

Ventral plates with three longitudinal furrows, the median one especially becoming more distinct caudad and crossing entire length of plates, the lateral furrows on the fourteenth and fifteenth plates indistinct.

Coxal pores eight to fifteen in two or three series, there being two series on the anal coxae and three on the others.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 1, 3, 2}$; of the second, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third to ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth and eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth to penult inclusive, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, the claw of the penult legs with a well-developed accessory claw; of the anal $\frac{1, 0, 3, 1, 0}{1, 1, 3, 3, 1}$, the claw single. Last two pairs of coxae laterally armed.

Anal legs in female moderately long, slender.

Gonopods of female with the claw small; not at all or but slightly curved; rather deeply bipartite with the lobes acute, equal (Plate **3**, fig. 7). Basal spines 2 + 2, with the inner one of each pair distinctly smaller than the outer; spines in surface view showing a short, not at all acute, terminal portion and a proportionately long subcylindric basal portion that is somewhat broader distally than proximally (Plate **3**, fig. 8).

Length 15 mm.; width of tenth plate, 2.3 mm.; length of antennae 7 mm.; of anal legs, 7.8 mm. Type, M. C. Z. 687.

Locality.— Alaska (Forrester Island!). Collected by Harold and Ronald Heath, May 20–26, 1913.

Ethopolys Chamberlin.

Can. ent., 1912, **44**, p. 173.

Lateral marginal thickening of head abruptly discontinuous or broken a little back of middle or near caudal end of the longitudinal curved impression back of each eye (Plate **4**, fig. 1).

Antennae usually, but not always, rather long and reaching to or beyond the eighth segment. Composed of twenty or rarely of as many as twenty-eight articles.

In the prosternum a well-marked diastema separating an outer group of teeth on each side from a larger inner group with a basally stout but distally slender spine situated in the diastema (Plate **4**, fig. 2.)

Claw of anal legs armed with a minute accessory claw or this obsolete or absent; that of the penult legs with two accessory claws.

Coxae of last two pairs of legs each bearing a stout ventral spine as well as a dorsal and a lateral one.

Gonopods of male distinctly biarticulate.

Claw of female gonopods tripartite or entire; when tripartite with the lateral divisions small and situated considerably proximad of the median one. Basal spines 3 + 3 or 4 + 4 or occasionally 4 + 5.

TYPE.— *Ethopolys xanti* (Wood).

In this genus a semicircular impression caudad of each eye is distinct as in the preceding genus. As in Bothropolys also there is not great variation in the spining of the legs within the genus, this largely being the same also as for that genus. The dorsal spines of the anal legs are always 1, 0, 3, 1, 0; the ventral 1, 1, 3, 2, 1, the claw with a very small accessory spine or single. Dorsal spines of the penult legs 1, 0, 3, 1, 1, ventral 1, 1, 3, 3, 2, two accessory claws present. Dorsal spines of the thirteenth legs 1, 0, 3, 2, 2, or, more rarely, 1, 0, 3, 1, 1; the ventral, 0, 1, 3, 3, 2. Dorsal spines of the twelfth legs, 0, 0, 3, 2, 2 or 1, 0, 3, 2, 2, or, more rarely, 1, 0, 3, 1, 1; ventral always 0, 1, 3, 3, 2. Dorsal spines of the eleventh legs, 0, 0, 3, 2, 2, or 1, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2 or rarely 0, 0, 2, 3, 2. Dorsal spines of the second legs, 0, 0, 3, 2, 2; ventral 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 3, 2, 1; ventral 0, 0, 2, 3, 2.

In the species known to belong to this genus either none of the dorsal plates have their posterior angles produced or else those of the ninth, eleventh, and thirteenth are extended. The name Ethopolys *sens str.* may cover the latter group which contains the type, *E. xanti* (Wood), while for the former Archethopolys, subgen. nov., with *E. integer* Chamberlin as the type, may be used.

The prosternal spine in the species of this genus seems practically always to retain its slender terminal portion throughout life (Plate **4**, fig. 2, 3, 4; Plate **5**, fig. 7; Plate **6**, fig. 6).

In variations in the specimens of species of this genus resulting in entirety or a marked tendency toward entirety of the claw of the female gonopods, the result is due apparently to reduction in or disappearance of the lateral teeth with coördinate strengthening of the median one, to a removal of the lateral teeth rather than to an evening

Fig. 3.— Distribution of Ethopolys Chamberlin.

up such as occurs in Bothropolys. The consequence of this is a long, distally acute claw (Plate **5**, fig. 8), contrasting with the blunt claw in Bothropolys (Plate **2**, fig. 7; Plate **3**, fig. 1).

Key to Species of Ethopolys.

a. Posterior angles of none of the dorsal plates produced. *Archethopolys* subgen. nov.

b. Only one tooth ectad of the diastema on prosternum; dorsal spines of twelfth legs, 1, 0, 3, 1, 1; antennae short; length 14–18 mm. *E. pusio* (Stuxberg).

bb. Two or more teeth (at least on one side) ectad of diastema on prosternum; dorsal spines of twelfth legs, 1, 0, 3, 2, 2, or 0, 0, 3, 2, 2; antennae long; length, 19–35 mm.

c. Prosternum normally with only two teeth ectad of diastema, rarely with three; claw of female gonopods always tripartite.

d. Antennae reaching to or beyond the ninth segment; color yellow to light amber-brown, the head not reddish. *E. bipunctatus* (Wood).

dd. Antennae not extending beyond the eighth segment; color darker brown, commonly in part dusky, head of reddish cast, typically chestnut..... *E. sierravagus* (Chamberlin).

cc. Prosternum normally with three or four teeth ectad of diastema, only occasionally with but two; claw of ♀ gonopods entire or bipartite.

d. Head coarsely and conspicuously punctate; claw of female gonopods entire, with no distinctly developed lateral teeth. (Washington, etc.)..... *E. integer* Chamberlin.

dd. Head not punctate, or punctae scarce and fine; claw of ♀ gonopods bipartite (Alaska)..... *E. integer alaskanus* Chamberlin.

aa. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. *Ethopolys sens.str.*

Claw of ♀ gonopods tripartite; prosternum with three or two teeth ectad of diastema..... *E. xanti* (Wood).

Archethopolys, subgen. nov.

Ethopolys bipunctatus (Wood).

Plate 5, fig. 5.

Bothropolys bipunctatus Wood, Journ. Acad. nat. sci. Phil., 1863, new ser., **5**, p. 16. Trans. Amer. philos. soc., 1865, **13**, p. 153.

Lithobius (Archilithobius) bipunctatus Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 3, p. 14, 30.

Lithobius bipunctatus Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 22.

Ethopolys bipunctatus Chamberlin, Can. ent., 1912, **44**, p. 174.

Description.— This is the palest species of the genus, varying from light amber-brown, with the first one and the last several seg-

ments lighter, to almost clear yellow and uniform or with the last few segments a little darker. Head mostly very dilute orange, faintly dusky caudad of the frontal suture. Antennae very light brownish yellow or yellow proximad and darker distad of proximal third or half of length excepting sometimes at very tip. Prosternum and prehensorial feet and last ventral plates dilute orange or rusty yellow. Last pairs of legs yellow of weak orange or rusty tinge or the tarsi darker and more distinctly orange Venter over median portion often brownish or dusky, usually clear, yellow cephalad.

Gradually and uniformly narrowed caudad from the tenth plate and also narrowed cephalad of the tenth plate considerably more than in the related species. Head with sides convex, a little converging from the eyes to the marginal breaks and then more strongly than usual rounding and converging mesocaudad to the caudal corners. The usual short median longitudinal impression contiguous with and immediately in front of the median angle of the caudal marginal thickening, with from its anterior end two weak furrows diverging from it cephalad.

Eyes composed of from thirteen to twenty-two ocelli, which are distinct and regular. Series three or four but mostly the latter. Single ocellus much larger than the others, paler, broadly elliptic, not contiguous with other ocelli. The number of ocelli is frequently seventeen in the following arrangement: $1 + 5, 5, 3, 2$; $1 + 5, 5, 5, 4$; and $1 + 5, 4, 3$.

Antennae long, usually reaching the ninth segment. Composed of twenty long, subcylindric articles, of which those distad of the proximal three to five are usually more strictly cylindric. Hairs rather short.

Prosternum 1.7 times wider than long. Chitinous lines absent or obscure. Spine attached a little caudad of anterior edge of diastema; attenuated and becoming distally bristle-like, pale. The most frequent number and arrangement of the teeth is $2 - 6 + 6 - 2$, *i.e.*, with two teeth ectad of and six teeth mesad of the diastema on each side. Other arrangements are: $1 - 6 + 6 - 2$; $2 - 5 + 6 - 3$; $1 - 5 + 5 - 3$; and in once case even $4 - 7 + 6 - 4$.

Posterior angles of none of the dorsal plates produced, those of the ninth, eleventh, and thirteenth being obliquely excised. All major plates roughened, the more posterior ones most strongly so, the first plate, however, being smooth or nearly so. Major plates with one or two longitudinal furrows on each side subparallel with the margin and which may be more or less broken and a third oblique furrow running

from near middle of anterior margin caudoectad and meeting the lateral furrows at an angle; these furrows absent from or very obscure on first plate. First, third, fifth, eighth, tenth, twelfth, and fourteenth plates with the usual short transverse submarginal sulcus on each side near beginning of caudal third of length and all of these plates excepting the first also with a distinct subtranverse impression near each anterior corner; the seventh plate also with two corresponding pairs of impressions but, as usual, the posterior pair of these is near the caudal corners. The minor plates, especially the more caudal ones, with a curved, subtransverse, sulcus at each anterior corner, the impression running somewhat caudomesad with the convexity caudad and mostly covered by edges of major plates; also with a short curved mark at each caudal corner adjacent to marginal thickening.

First ventral plate with two fovea near anterior margin and cephalad of the broad depression on the more caudal portion of plate, a short transverse deeper furrow occurring in the latter depression. Of the usual three longitudinal impressions the lateral ones show in varying degrees of distinctness; the median may be only obscurely indicated on the anterior plates, while it becomes more distinct on the caudal. On most a transverse depression in front of caudal margin which is commonly distinctly furrow-like on at least the last two plates where it terminates.

Coxal pores twelve to twenty-five in number on each coxa arranged in three or four series. As usual, of varying sizes, those of the most anterior row much smallest and often minute; all circular or subelliptic.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the second to the tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,1,3,3,2}$; of the thirteenth, $\frac{0,0,3,2,2}{0,1,3,3,2}$ or $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,2}$, two accessory claws present; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$, claw single.

Anal legs long and slender; those of male not manifestly modified.

Claw of female gonopods long and stout, considerably curved, tridentate distally, the lateral lobes less proximad than usual, the median much stoutest. Basal spines 3 + 3, the outermost a little stouter than the median and the innermost considerably less robust than the median, all often bent a little ectad at tips, black above bases.

The two articles of male gonopods together subconical, the distal article apically rounded. Proximal article mostly with near four bristles and the distal with two.

Length from 19 mm. to 29 or 30 mm. A female 24.5 mm. long has the tenth plate 3.1 mm. wide; the third 2.5 mm. wide; the first at

widest level 2.8 mm. wide; the antennae 15 mm. long; and the anal legs 13 mm. long.

Pseudomaturus.— Coloration somewhat paler than the average in adult, the head being more yellow without or with but little of the orange or rusty tinge. Antennae yellow. Anal legs yellow. Other legs often pale dusky brown proximally with tibiae and tarsi yellow. Caudal ventral plates often dusky.

Ocelli about twelve in three series; *e. g.*, 1 + 4, 4, 3; not contiguous. The most caudal ocellus in each of the two upper series considerably larger than others.

Antennae very long, reaching to or a little beyond the ninth segment. Articles twenty, long and mostly strictly cylindric as in the adult.

Prosternal teeth 2 − 5 + 5 − 2, mostly. Spine slender and pale. Teeth regular and uniform, darkened distally. Chitinous lines faint.

Coxal pores in two series, those of the more cephalic one much smaller and generally fewer; six to twelve on each coxa, the distal one of caudal row often very much larger than others.

Spines of first to sixth legs, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of seventh to ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,1,3,3,2}$; of the thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$.

Distal article of male gonopods broadly subconic, in specimen described glabrous; first article with two or three bristles.

Length of specimen described 15.5 mm.; of antennae 9.5 mm.; of anal leg 9 mm.

Immaturus.— Coloration very similar to that of the *pseudomaturus* but still paler; the antennae palest proximally and at tips, somewhat orange elsewhere. Legs more uniform in color, the tarsi a little brighter; anal legs yellow.

Ocelli six or eight in two or occasionally in three series; *e. g.*, 1 + 3, 2; 1 + 3, 3, 1. The first ocellus of the upper row rather larger than the single ocellus, much larger than other seriate ones. Organ of Tomösvary a little smaller in outline than the smallest ocellus.

Antennae proportionately shorter, reaching only to the eighth segment. Articles twenty or twenty-one all relatively shorter than in the adult and some, occurring mostly in two's at intervals, much shorter, or as many as six of these may be grouped immediately proximad of the ultimate one. Hairs relatively longer than in the adult.

Prosternum with chitinous lines weak but rather more distinct than in the older stages. Teeth 1 − 4 + 4 − 1 or 2 − 4 + 4 − 2 with

the outermost one on each side in the latter case very small. Spine slender and bristle-like above base.

Coxal pores in one series, small with very pale margins; 2, 3, 3, 2 or 2, 3, 3, 3.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,1,1,1}$ to $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the second, $\frac{0,0,3,2,1}{0,0,1,2,1}$ or $\frac{0,0,3,2,1}{0,0,2,2,1}$; of the third to fifth, $\frac{0,0,3,2,1}{0,0,2,3,1}$; of the sixth to eighth, $\frac{0,0,3,2,2}{0,0,2,3,1}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,2,2}{0,1,2,3,2}$, the spine of the trochanter minute; of the thirteenth, $\frac{0,0,3,1,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{1,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,0}$.

Second article of male gonopods distinct, rather short, rounded apically, pale and glabrous. Proximal article narrowed from base to second article, where it is of same width as the contiguous portion of the latter, bearing one bristle.

A male 9 mm. long has antennae 5.75 mm. and anal legs 4.25 mm. long.

Agenitalis.— Pale brown mesally, whitish towards ends with the first and last segments yellow. Head yellow, whitish caudally. Antennae whitish yellow. Legs pale, the caudal pairs of a yellowish tinge.

Ocelli five in two series; thus, 1 + 2, 2. All pale, the single ocellus smaller than the proximate one of the upper row, all separated from each other. Organ of Tomösvary very small in outline.

Antennae reaching to the seventh segment. Articles seventeen short, the shortest ones occurring at intervals. Hairs relatively longer than in the adult.

Prosternal teeth 1 − 4 + 4 − 1, spine bristle-like above base. Teeth brown above bases, distally rounded, uniform; or the outermost and innermost on each side a little smaller than the others.

Coxal pores 1, 1, 1, 1 or 2, 1, 1, 1.

Spines of first legs, $\frac{0,0,0,0,1}{0,0,0,1,1}$ to $\frac{0,0,0,1,1}{0,0,1,1,1}$; of second to seventh, $\frac{0,0,2,1,1}{0,0,1,1,1}$, the ventral spine of third article minute; of eighth and ninth, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the tenth, $\frac{0,0,2,1,2}{0,0,1,2,1}$; of the eleventh, $\frac{0,0,2,1,1}{0,0,1,2,1}$, of the twelfth, $\frac{0,0,2,1,0}{0,0,1,1,1}$; of the thirteenth, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the penult, $\frac{0,0,0,0,0}{0,0,1,1,1}$ or $\frac{0,0,0,0,0}{1,0,1,1,1}$; of the anal, $\frac{0,0,0,0,0}{1,0,1,1,0}$. The spine on the ventral surface of the third article becomes smaller and smaller cephalad, on the first pair being minute and difficult to detect or quite absent.

Gonopods very short and mostly concealed; undivided.

Anal glands still evident.

Length 7.5 mm.; antennae 4.6 mm. long; anal leg 2.8 mm. long.

Type Locality.— "United States West of the Rocky Mountains" (George Suckley, collector).

KNOWN LOCALITIES.— Utah (Emigration Canyon! Wildwood. Provo Canyon! Clinton's Cave, near Lake Point! Uintah Mountains! Daniell's Creek!). Nevada!

ETHOPOLYS SIERRAVAGUS (Chamberlin).

Plate **5**, fig. 1–4.

Lithobius sierravagus Chamberlin, Proc. Acad. nat. sci. Phil., 1903, p. 154.
Bothropolys monticola Chamberlin (*ad part. max. non* Stuxberg), Pomona coll. journ. ent., 1910, **2**, p. 369.
Ethopolys sierravagus Chamberlin, Can. ent., 1912, **44**, p. 174.

DESCRIPTION.— Dorsum light to dark brown, commonly dusky and sometimes very dark, the first one and commonly the last two plates commonly of dilute chestnut cast like the head; nearly always on the major plates a pale median longitudinal stripe with one on each side of it extending obliquely ectocaudad; sometimes some or all of the principal plates bordered caudally and laterally with a distinct stripe of blackish. Head from brown of slight reddish cast to dilute or clear chestnut, dusky immediately caudad of the frontal suture. Antennae proximally like the head, distally light brown or yellowish. Legs brown or testaceous, the posterior pairs darker, often of dilute chestnut tinge. Venter brown, the fourteenth and fifteenth plates of chestnut cast. Prosternum and prehensors dilute chestnut.

Body from 7.75 to 8.5 times longer than wide. The first plate in both male and female considerably narrower than the tenth. Widths of head and of first, third, eighth, and twelfth plates to each other in ♀ as 80 : 81 : 75 : 85 : 87 : 82; in a ♂ as 69 : 70 : 65 : 74 : 75 : 73. The first plate is slightly wider than the head.

Head wider than long (67 : 65 in a ♂; 77 : 75 in a ♀). Of the usual general form, being widest near or in front of lateral marginal breaks. A U-shaped impression, which is not very deep, on caudal portion, the mark being connected at its middle with a short longitudinal furrow extending to the caudal marginal thickening; a rather deep short transverse submarginal sulcus a little caudad of level of marginal break on each side. Surface a little uneven, subsparsely and rather finely punctate.

Eyes consisting mostly of from thirteen to twenty ocelli arranged in three or four, but much most commonly in four series; *e.g.*, 1 + 4, 5, 4, 2; 1 + 5, 5, 3, 2; 1 + 6, 6, 4, 3; 1 + 6, 5, 4, 2; 1 + 5, 5, 4, 2; 1 + 5, 5, 4; 1 + 6, 5, 3; 1 + 5, 4, 3. Seriate ocelli distinct, decreas-

ing gradually and but little cephalad and ventrad, those of the most ventral row often very small. Single ocellus separated by a space from the others; pale; subtriangular, with the sides convex and the angles rounded.

Antennae of moderate length but varying considerably, mostly reaching the seventh segment, but sometimes the eighth and rarely even the ninth on one side. Articles from twenty to as many as twenty-eight; mostly long and subcylindric, distal ones slender; the ultimate much shorter than the two preceding taken together, or when the articles are twenty often but little longer than the penult or even shorter than it. In antennae with the larger numbers of articles a variable number of those preceding the ultimate have become divided, giving correspondingly shorter articles; thus in an antenna with twenty-four articles the first eleven may be of the usual long form while the next six have divided, giving twelve decidedly shorter articles which with the ultimate increases the number from twenty to twenty-four, etc. (Plate 5, fig. 3, 4). Often the antennae with the larger number of articles are relatively shorter than those with fewer. Hairs very short, dense.

Prosternum between 1.66+ and 1.8 times wider than long. Distance between chitinous spots 2 to 2.25 times the dental line, 1.8 or 1.9 times width at level of bottom of mesal sinus. Spine situated very close to or nearly upon anterior margin; stout at base and distally acuminate as usual. Nearly always two teeth ectad of each diastema, sometimes but one on one or both sides or with these on one side, much more rarely upon both. Much the most frequent arrangement noted is $2 - 7 + 6 - 2$, with the larger number on the left side. Other arrangements observed are as follows, the left side being represented first: $2 - 6 + 7 - 2$; $2 - 6 + 6 - 3$; $2 - 6 + 6 - 1$; $2 - 6 + 6 - 2$; $1 - 6 + 6 - 1$; $2 - 6 + 7 - 1$; $2 - 11 + 6 - 2$; $3 - 6 + 6 - 2$; $3 - 6 + 6 - 3$.

First dorsal plate of the usual form; surface like that of head; twice as wide as long. Other plates rugose and tuberculate laterally, the median portion remaining smoother, the roughening becoming more and more pronounced in going caudad; the roughening clearly less than in *E. xanti*. The short submarginal transverse sulci near beginning of the caudal third evident on the first, third, fifth, eighth, tenth, twelfth, and fourteenth plates as usual but apparently less pronounced than in *E. integer;* from the inner end of each of these extends a furrow mesocephalad and another directly cephalad to the anterior margin, the latter furrow on the more caudal plates extending through to or nearly to the caudal margin.

Posterior angles of none of the dorsal plates produced; those of the ninth, eleventh, and thirteenth straight to considerably obliquely excised, occasionally those of the thirteenth very slightly produced.

Ventral plates with the usual three longitudinal furrows of which the median one is mostly pit-like and confined to the caudal part of plate but may be more indistinctly extended cephalad and caudad. In the female the fourteenth and fifteenth plates are transversely depressed across the middle with the furrows obscure; but in the male the furrows are strongly impressed, the lateral ones on the fourteenth converging caudad and commonly ending abruptly at beginning of caudal fourth of length, while on the fifteenth the lateral furrows are subparallel or a little excurved and terminate abruptly as on the fourteenth, while the median furrow on both plates is typically reduced to one or a row of a few impressed dots or pits but may appear as a continuous sulcus, especially on the fourteenth; the lateral furrows also may appear as rows of dot-like pits. A wide lateral and caudal border on both of these plates is smooth and densely clothed with fine short hairs.

Coxal pores mostly twenty-five to forty-five in number on each coxa, the smallest number being on the twelfth pair. Series three to five, the most anterior of which is often irregular or confused.

Spines of first legs, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the second, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the third to tenth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the twelfth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$ or $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{1,\ 1,\ 3,\ 3,\ 2}$, with two accessory claws; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{1,\ 1,\ 3,\ 2,\ 1}$ to $\frac{1,\ 0,\ 3,\ 1,\ 0}{1,\ 1,\ 3,\ 3,\ 1}$, the claw single or with a minute accessory claw. Last two pairs of coxae laterally armed or, occasionally, only the last pair.

Claw of gonopods of female of moderate size, comparatively broad distally, distinctly tripartite, the median lobe largest, the lateral proximad of the median (Plate **5**, fig. 1). Occasionally one lateral tooth may be replaced by two or more minute denticles or may be almost obliterated. Basal spines 3 + 3 to 4 + 4, typically gradually and uniformly narrowing from base to the subacute distal point. When a fourth spine is present it is commonly small and inserted on mesal side of article where it is easily overlooked (See Plate **5**, fig. 2).

Length from 20 to 28 mm. A female 28 mm. long has the anal leg 12 mm. long and the tenth dorsal plate 3.6 mm. wide.

Pseudomaturus.— Light brown, the major dorsal plates with the three longitudinal pale lines well marked, last segment darker. Head pale orange, dusky, clearer in color immediately along the frontal suture. Prosternum and prehensorial feet pale orange. Antennae yellowish or light orange-brown, paler distad. Legs pale, the tarsi

brighter. Last pairs light orange, somewhat duller in color proximally. Venter pale brown, the last segment a little darker.

Ocelli 1 + 5, 5, 3, 2 in specimen described. Single ocellus very much larger than any other, suborbicular or broadly suboval with the narrower end ventrocephalad. Organ of Tomösvary in outline smaller than smallest ocellus, in line with ventral row and close to anterior ocellus of same.

Antennae, in specimens examined, composed of from twenty to twenty-two articles, when twenty-two the extra ones apparently resulting from subdivision of the penult and antepenult articles; the ultimate article relatively shorter than in earlier stages.

Prosternum with chitinous lines distinct. Teeth 2 − 6 + 6 − 2. Spine as in *maturus*.

Coxal pores eleven to nineteen in number, in three series, sizes varying as in *maturus*.

Spines of first to third legs, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,2}$; of the fourth, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,2}$ or $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the fifth to ninth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the tenth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$ to $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the eleventh, $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the twelfth, $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$; of the thirteenth, $\frac{1,\,0,\,3,\,2,\,1}{0,\,1,\,3,\,3,\,2}$ or $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$; of the penult, $\frac{1,\,0,\,3,\,1,\,1}{1,\,1,\,3,\,3,\,2}$; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{1,\,1,\,3,\,2,\,1}$.

Fifteenth and succeeding segment subdensely pilose on ventral surface, hair of the fourteenth fewer.

Claw of the female gonopods shorter and thinner and less strongly chitinized than in the adult, the teeth as usual. Basal spines 3 + 3, but the innermost on each side only about one half the height of the median one and much more slender.

Length 19 mm.; antennae 10 mm.

Praematurus.— Pale brown, with violaceous tint showing through from beneath. Head in front of suture, light orange, elsewhere darkened or smoky. Antennae pale brown to yellowish, tending towards orange, paler distad.

Ocelli 1 + 4, 3, 2; 1 + 4, 4, 2. Rather pale. The single ocellus larger than the first one of the upper row, the anterior ones of ventral row very small.

Antennae reaching well along on eighth segment. Articles twenty, all of moderate length or long, the last one much longer than the penult.

Prosternal teeth 2 − 5 + 5 − 2.

Coxal pores very small, the distal one of caudal series conspicuously largest; arranged in two series, four to nine in number on each coxa, the smallest number occurring on the twelfth and the fifteenth coxae.

Spines of first and second legs, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,1}$; of the third to the sixth,

$\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the seventh to the ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of tenth and eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 2}$. (Anal missing). Coxae of last two pairs armed as in the adult.

Fifteenth ventral plate subdensely pilose, especially over the caudal portion.

Claw of female gonopods pale, short, and thin, not curved, the lateral teeth appearing only as points at base. Spines 2 + 2, the innermost on each side short and very slender, almost bristle-like.

Length of male 13 mm.; antennae 7.5 mm. Length of female, 15 to 16 mm.; antennae 7.5 to 7.8 mm.

Type Locality.— California (Shasta Springs).

Known Localities.— California (Truckee! Shasta Springs! Hayward). Oregon (Portland! Oregon City!).

Ranging from Portland southward along the Sierra Nevada Mountains. It seems not to occur in the coastal mountains or the region south of San Francisco Bay. North of Oregon it is replaced by *E. integer* Chamberlin, a closely related species.

Ethopolys integer Chamberlin.

Plate **5**, fig. 6–8. Plate **6**, fig. 1.

Ethopolys integer Chamberlin, Rept. Can. Arctic exped., 1913–18, 1919, **3**, pt. H, p. 20 H.

Description.— Dorsum mostly dark brown with the caudal plates darker; major plates often darkened over the lateral and caudal borders; major plates of posterior half of body typically with a distinct longitudinal median black stripe, this becoming indistinct on the more anterior ones; main plates commonly with a light stripe extending obliquely caudolaterad on each side from near middle of anterior margin. Head, as also in part the first dorsal plate in some, reddish brown to chestnut; a blackish median longitudinal stripe extending from caudal margin to frontal suture caudad of which it expands laterad. Antennae brown to light chestnut, paler, light brown, distad. Venter light brown, the fourteenth and fifteenth sternites commonly of a chestnut tinge. Prosternum and prehensors brown of a light chestnut tinge. Legs testaceous, the posterior pairs darker, brown to light chestnut-brown.

Body of same form in male and female; or nearly so. About eight times longer than width of the tenth plate. Head and first dorsal

plate of same width, narrower than the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other in ♂ as, *e.g.*, 77 : 77 : 70 : 78 : 79 : 78 or 72 : 73 : 66 : 75 : 76 : 73; and in ♀ as, *e.g.*, 84 : 84 : 78 : 87 : 87 : 85 or 84 : 84 : 76 : 86 : 87 : 85.

Head distinctly wider than long (86 : 79); widest a little caudad of lateral breaks. A V-shaped impression on caudal half of cephalic plate. Entire surface subdensely punctate, the puncta distinct.

Ocelli from twelve to nineteen in three or four series, but by far most commonly in 4; *e.g.*, 1 + 5, 6, 4, 3; 1 + 6, 5, 4, 3; 1 + 5, 5, 4, 2; 1 + 5, 5, 3, 2; 1 + 5, 5, 4, 3; 1 + 5, 5, 3, 1; 1 + 5, 4, 3, 2; 1 + 5, 4, 2; 1 + 5, 5, 4; 1 + 6, 5, 3. Single ocellus much largest, suborbicular to somewhat angular, clearly separated by a space from the others. Seriate ocelli distinct, regular, decreasing moderately ventrad and cephalad.

Antennae reaching to from the fifth to the eighth segments, but mostly to the sixth or the seventh. Articles twenty to twenty-four mostly long and cylindric or nearly so, mostly not clavate or but slightly so. Ultimate article long and slender, a little shorter than the two preceding together.

Prosternum *cir.* 1.7 times wider than long. Distance between chitinous spots in specimen measured 1.97 times the dental line and 1.75 times the width at level of bottom of median sinus. Chitinous lines well developed excepting toward caudal ends. Finely, densely punctate. Spine inserted on ventral surface a little caudad of the anterior edge; moderately short, uniformly attentuated to an acute point; much stouter than the bristles (Plate 5, fig. 7). Teeth conical, subacute or apically narrowly rounded; those adjacent to diastema on each side largest, others very gradually decreasing ectad and mesad from these. Most commonly three or four teeth ectad of diastema but also in some only two. Examples of arrangement are as follows, the left side being indicated first in the formulae: 3 − 7 + 6 − 3, the commonest of all arrangements and numbers; 3 − 6 + 6 − 3; 3 − 5 + 6 − 3; 4 − 6 + 6 − 4; 2 − 6 + 6 − 3; 2 − 6 + 6 − 2; 2 − 6 + 5 − 2.

First dorsal plate narrowed from anterior end caudad as usual, wider than long nearly in ratio 21 : 11; surface nearly like that of head, punctate but not rugose. Major plates with the short transverse impressions at caudal third of length deeply marked. A furrow extending from inner end of each of these submarginal sulci obliquely mesocephalad to near middle of anterior margin and also an irregular deep furrow extending directly cephalad to anterior margin. All

plates distinctly and rather coarsely punctate, and, especially the more caudal ones, subfinely rugose and irregularly tuberculate toward lateral borders, the median portion remaining nearly smooth excepting on the fifteenth plate.

Ventral plates, excepting last one or two, densely finely punctate over entire surface. A lateral longitudinal impression in front of the short suture at each caudolateral corner, these being more narrowly and sharply impressed on caudal plates. On the caudal portion between the lateral impressions is a short median pit or depression which, however, is sometimes elongate. The fifteenth sternite is wholly smooth over a wide lateral and caudal border and is here densely clothed with very fine, short hairs. In the male the fourteenth plate has a V-shaped impression formed by two distinct sulci converging from the anterior margin to a point at or a little in front of the caudal margin or these converging sulci sometimes ending farther cephalad and not meeting; also a median longitudinal sulcus usually of same distinctness as the lateral ones. In the male the fifteenth sternite also is marked with three deeply impressed longitudinal sulci which terminate at the beginning of the smooth caudal border; of these the lateral converge a little but less than those of the fourteenth plate.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,2,3,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$ (at least on one side); of the second to tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,1,3,3,2}$ or $\frac{0,0,3,2,2}{0,1,3,3,2}$; of the thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,2}$, with two accessory claws; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$, claw single or with a very minute accessory claw. Last two pairs of coxae, or occasionally only the last pair, laterally armed.

Anal legs of male moderately long, slender, the fourth joint with a longitudinal dorsal sulcus over the median portion and ectad of this a longer sulcus extending the full length of the joint; corresponding to the latter there is an ectodorsal longitudinal sulcus on the fifth joint. Third joint with a longitudinal dorsal sulcus.

Claw of female gonopods long and well curved; entire, with no trace of lateral teeth (Plate **5**, fig. 8). Basal spines 3 + 3; acuminate from near middle of length, apically narrowly rounded.

Length 20 to 30 mm. A female 29 mm. long has anal leg 12 mm. long, antennae 15 mm. long and the tenth dorsal plate 3.6 mm. wide. A male 25 mm. long has the tenth plate 3.2 mm. wide.

Type Locality.— Washington (Pullman!).

Known Localities.—Washington (Wenatschee! Pullman!). Oregon (Corvallis!).

This species is very close in general appearance and structure to

E. sierravagus Chamberlin; but the females are easily separated by the character of the gonopods. They differ ordinarily in the relative length of the ultimate article of the antennae; in the proportionate length of the prosternal dental line and the modal number of teeth ectad of the diastema; and in various other minor points.

Ethopolys integer alaskanus Chamberlin.

Plate 6, fig. 2.

Rept. Can. Arctic exped. 1913–18, 1919, **3**, pt. H., p. 21 H.

While in *E. integer* the head and first dorsal plate are strongly and rather coarsely punctate, especially over the anterior portion of the head, these parts in the Alaskan specimens representing the present subspecies are smooth and wholly without punctae or very nearly so.

Posterior angles of thirteenth dorsal plate weakly produced, those of the eleventh showing slightly a similar tendency.

The claw of the female gonopods in the two type females has a distinct tooth on the inner side toward the distal end but none on the outer, being thus bipartite instead of essentially entire as in *integer*, or tripartite as in *sierravagus*.

In the two female types from Forrester Island a median dorsal black stripe is distinctly marked from the caudal end of the fourteenth plate cephalad to the frontal suture of the head. In one specimen the dorsum is dark brown, dusky about edges of plates and with the head and most caudal plates of a dilute chestnut cast; the posterior legs testaceous, streaked with dark. The other specimen is much darker with the chestnut tinge affecting all the plates.

The specimens from Sitka (males), presumably of the same subspecies, as they are at present wholly lack any reddish tinge, the color being a dull, nearly uniform, dusky olive brown.

Dorsal spines of first legs in Sitka specimens 0, 0, 2, 2, 1. Dorsal spines of second legs in specimens from both localities may be 0, 0, 3, 2, 1 or 0, 0, 3, 2, 2.

Length of max. ♀, 23 mm.

Type Locality.— Alaska (Forrester Island!).

Collected by Harold and Ronald Heath. Also taken in Alaska (Sitka!).

Ethopolys pusio (Stuxberg).

Plate **6**, fig. 3–6.

Lithobius pusio Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 2, p. 66. Ann. mag. nat. hist., 1875, ser. 4, **15**, p. 188.
Lithobius (*Archilithobius*) *pusio* Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 3, p. 16, 30. Proc. Cal. acad. sci., 1876, **7**.
Bothropolys pusio Chamberlin, Can. ent., 1911, **43**, p. 378.
Ethopolys pusio Chamberlin, Can. ent., 1912, **44**, p. 174.

Description.— Dorsum brown commonly of a reddish tinge or chestnut, head usually not darkened, being concolorous with dorsum; some of major plates in same specimens with the caudal border very dark and some with a median dark stripe. Antennae reddish brown, pale distad. Prosternum brown, with the prehensors light, often rusty, yellow. Posterior ventral plates like the prosternum, the rest of the venter and the legs lighter brown, the caudal pairs of legs being commonly lighter, yellow, distad.

The body from 7.6 to 8+ times longer than width of tenth plate, apparently more robust in the male. In the male widest at tenth plate, the body attenuated cephalad to the second segment; first plate narrower than the eighth. In the female the eighth and tenth plates are rather more nearly equal in the width and the attenuation of the body slighter.

Head subcordate, the sides between the eyes and the rounded caudal corners weakly excurved and slightly converging caudad. Anterior margin arcuate, being convex at middle, then on each side concave, and then again convex adjacent to the antennae. Wider than long in about ratio 47 : 43 or nearly 12 : 11. The usual short, sharply impressed, curved sulcus extending mesad or cephalomesad from each lateral margin near the break. A short furrow near each caudolateral corner. Head finely and lightly punctate.

Eyes consisting of from eleven to thirteen ocelli in three series: *e. g.*, 1 + 5, 3, 2; 1 + 5, 4, 3; 1 + 4, 4, 2; 1 + 4, 4, 3, which is frequent. Ocelli usually not deeply pigmented, greyish; decreasing in size ventrad. Single ocellus subcircular, but little larger than the adjacent one of the first row. Organ of Tomösvary in outline much smaller than the smallest ocellus, at anterior end of most ventral row of ocelli.

Antennae short, reaching the sixth dorsal plate. Composed normally of twenty articles which are moderately long and nearly uniform

in proportions. Clothed with moderately long and sometimes somewhat rufous hairs.

Prosternum one and two thirds times wider than long. Chitinous lines distinct. Mesal incision narrow, acute. Spine slender, distally bristle-like. One tooth ectad of diastema. Teeth mostly 6 + 6 or 6 + 7.

Posterior angles of none of the dorsal plates produced. Third, fifth, eighth, tenth, twelfth, and fourteenth with the usual short, submarginal sulcus on each side near beginning of caudal third of length; the seventh with a similar but less distinct impression farther caudad and a second similarly weak one toward anterior corner. Plates finely rugose, most with two sublongitudinal and often broken furrows, one a little each side of middle, and sometimes, especially on the caudal segments, also with a median longitudinal furrow which may be doubled.

First ventral plate with entire surface concavely depressed. Others with three longitudinal furrows, of which the median is rather short and often pit-like and lying near the middle portion of plate; sometimes with two poorly defined transverse furrows which on the anterior plates lie one near the anterior margin and one near the caudal, the anterior one lying farther caudad and the posterior one being more deeply impressed on the more posterior segments. On the posterior segments the median furrow becomes longitudinally elongate. On the fifteenth plate, especially in the male, the three longitudinal furrows are most distinct and converge commonly over nearly entire length of plate caudad to a less sharply defined transverse furrow in front of the caudal margin.

Coxal pores as usual of various sizes, mostly small and very small. Arranged in two or three series and usually from seven or eight on the twelfth to twelve on the other coxae.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second to the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 2, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 2}$, with two accessory claws; of the anal, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 2, 1}$. Last two pairs of coxae laterally armed.

Anal legs of moderate length and slender in both sexes.

Distal article of male gonopods considerably narrower than the first, apically rounded, with mostly two bristles; proximal article with four or five bristles.

Claw of female gonopods rather short and broad, tripartite, moderately curved. Basal spines 3 + 3 or sometimes only 2 + 2, cylindrical proximally and conical in outline distad, flattened or excavated on

dorsal side and sometimes with small accessory points at junction of cylindrical and distal portions.

Length mostly between 14 and 18 mm. A female 17.5 mm. long has the antennae 6.5 mm. and the anal leg *cir.* 5.5 mm. long, with the tenth plate 2 mm. wide. A male 15.2 mm. long has antennae 6 mm. and anal leg between 5.5 and 6 mm. long, with the tenth dorsal plate 2 mm. wide.

Praematurus.— Light brown or yellowish. Head light orange or light brown. Antennae orange or brown but paler distad. Legs whitish yellow to pale brown with caudal pairs more deeply pigmented, clearer yellow. Prosternum darker than venter with prehensors in darker specimens testaceous.

Ocelli in most cases 1 + 4, 3, 2; also 1 + 3, 3, 3, etc. Single ocellus suborbicular or broadly elliptic, paler than the others, of same size as most caudal ocellus of the upper row. Ocelli decreasing in size cephalad and ventrad.

Antennae composed of twenty long articles proportioned nearly as in the adult.

Prosternum with chitinous lines obscure. Spine as in *maturus*. Teeth mostly 6 + 6; distally well rounded. Ectal ones more widely spaced than others as in the *maturus*.

Impressions of head and dorsal plates already developed or indicated as in the adult.

Coxal pores small, usually in one series, which may be irregular, on the twelfth coxae, and in two series on the others; from three or four, on twelfth coxae, to seven or eight on each coxa.

Spines of first and second legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third to the ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 1, 2}{0, 0, 2, 3, 2}$ or $\frac{1, 0, 3, 1, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 2}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 2}$.

Claw of female gonopods rather slender, pale, distally a little curved, entire or with lateral teeth appearing as mere points at base. Basal spines 2 + 2, the inner one on each side scarcely one half the length of the outer and very much more slender.

Length of specimen described 11.8 mm.; of antennae *cir.* 6 mm.; of anal legs *cir.* 4.8 mm.

Immaturus.— Pale above and below, light violaceous brown, the anterior and the caudal segments orange. Head and antennae orange, the latter more yellowish, pale distad. Legs pale, brighter, yellowish, distad; caudal pairs light orange or yellow.

Ocelli six to eight in two series: *e.g.*, 1 + 3, 2; 1 + 3, 3; 1 + 4, 3. Pale. The single ocellus larger than the adjacent ones.

Antennae composed already of the twenty articles, of which part are relatively shorter than in the adult.

Prosternal teeth 4 + 4 with the spine on the extended edge ectad of outermost tooth, no tooth ectad of spine as yet developed. Chitinous lines very distinct, complete.

Coxal pores pale, small, in one series on the fifteenth or on this and the twelfth and in two on the others; in number from two (fifteenth) and four (twelfth) to six or seven (thirteenth and fourteenth) on each coxa.

Spines of first legs, $\frac{0,0,1,1,0}{0,0,0,1,1}$; of the second to eighth, $\frac{0,0,2,2,1}{0,0,0,1,1}$; of the ninth, $\frac{0,0,2,1,2}{0,0,1,1,1}$ to $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the tenth, $\frac{0,0,2,1,2}{0,0,2,2,1}$ or $\frac{0,0,3,1,2}{0,0,2,2,1}$; of the eleventh, $\frac{0,0,2,1,2}{0,0,2,2,1}$ or $\frac{0,0,3,1,2}{0,0,2,2,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,2,1}$ or $\frac{1,0,3,1,1}{0,0,2,2,1}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,2,1,1}$ to $\frac{1,0,3,1,1}{0,1,2,2,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,2,0}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,1,0}$, the lateral and dorsal spine of coxa also present, the lateral being small.

Gonopods in male appearing as simple, smooth, rounded prominences which are not yet biarticulate.

Gonopods of female triarticulate. Claw short, very pale, acutely pointed, with no signs as yet of lateral teeth. Basal spines 1 + 1, small, slender. Bristles very few.

Length, 6.5 to 8 mm.

Type Locality.— California, near San Francisco (probably Sausalito).

Known Localities.— California (Sausalito! Mill Valley! Brookdale! Santa Cruz Island! Capitola! Felton Big Trees!).

Stuxberg's types are evidently of the *immaturus* stage, a little later than those above described, as elsewhere indicated (Chamberlin, Can. ent., 1911, **43**, p. 379).

Ethopolys monticola (Stuxberg).

Lithobius monticola Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 2, p. 65. Ann. mag. nat. hist., 1875, ser. 4, **15**, p. 188.

Lithobius (*Archilithobius*) *monticola* Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 3, p. 14, 30. Proc. Cal. acad. sci., 1876, **7**, p. 137.

Bothropolys monticola Chamberlin (*ex part. minor*), Pomona college journ. ent., 1910, **2**, p. 369.

Ethopolys monticola Chamberlin, Can. ent., 1912, **44**, p. 174.

Description.— Lamina cephalica subcircularis, eadem fere latitudine ac longitudine, margine postico subrecto, setis punctisque impressis sparse praedita.

Antennae mediocres, articulis 20 maximam partem cylindraceis, setis rigidis vestitis compositae.

Oculi longitudine triplo majore quam altitudine, ocellis 7–9 in 2 series longitudinales digestis.

Coxae pedum maxillarium secundi paris dentibus 6 + 6 conicis, acutiuculis, nigerrimis armatae.

Scuta dorsualia rugulosa, sparsissime pilosa, 2°, 4°, 6°, 7°, 9°, 11°, 13° margine postico recto, angulis posticis rectis vel rotundate rectangulis, 1°, 3°, 5°, 8°, 9°, 12°, 14° margine postico elevato sinuato, angulis parum productis, rotundatae acuminatis.

Scutum ventrale 15 mm. fovea longitudinale profundiore, cetera omnia plana.

Pori coxales numerosi, in 3–4 series irregulares dispositi.

Pedes primi paris calcaribus 2, 3, 2. Pedum analium articulus primus calcaribus binis, altero majore inferiore, altero minore laterali armatae. Pedes anales ungue singulo, calcaribus 1, 4, 3, 1 — 1, 4, 3, 2 armati.

Color non manifestus.

Longitudo corporis 18 mm. Stuxberg.

Habitat.— Sierra Nevada (G. Eisen).

The identity of this species is at present a matter of considerable doubt. When it appeared that only one species of the Ethopolidae with none of the dorsal plates produced occurred in California, its identity with that form seemed probable; but the discovery of adult *E. pusio* makes this doubtful. The ocelli are given as seven to nine in two series. This agrees neither with adult *pusio* nor young *sierravagus*. If it be assumed that Stuxberg failed to note the most ventral row of eyes, then the agreement is close with adult *pusio* while the number would be still too small for *sierravagus*. The number of prosternal teeth agrees with *pusio* but is too small for *sierravagus* of the length given, so far as noted by the author. The spine-formula as given for the anal legs does not agree with that of either species as it stands. It is quite possible, indeed, that *monticola* is not the same as either of the species, and the only course open at present, therefore, is so to regard it. Should *pusio* and *monticola* prove to be the same, the latter name would have precedence.

Ethopolys (?) californicus (Daday).

Lithobius californicus Daday, Termes. füzetek., 1889, **12**, p. 153.

Description.— Corpore sat robusto, flavescenti; capite saturatiore colorato; antennis pedibusque dilute flavescentibus; oculis utrinque 14 in seriebus tribus positis; coxis pedum maxillarium dentibus 8 armatis; laminis dorsalibus inermibus, leviter punctatis; poris coxalibus multi seriatis, parvis rotundis; pedibus analibus sat crassis, ungue singulo; infra calcaribus 0, 1, 4, 3, 1, in articulo primo calcaribus duobus lateralibus armatis; calcarium genitalium femineorum tribus paribus.

Longit. corp. 20 mm. Latit. corp. 3 mm.

Patria: California borealis. Specimen unicum in spiritu vini rectif. conservatum a D. Joanne Vadonna collectum.

This species is placed under Ethopolys rather than Bothropolys because of the presence of 3 + 3 basal spines on the female gonopods. However, if a ventral spine is absent from the anal coxae as represented, it probably belongs to neither of these genera; but it is possible that one of the two lateral spines mentioned is the real ventral spine. The species is readily separated by its robustness and the small number of prosternal teeth 4 + 4. It is impossible, however, on account of the insufficiency of the description and of our knowledge of the myriopod fauna of a broad strip of country along the coast of California north of San Francisco, to say anything more definitely of this form without study of the type. The unusual spining given for the anal leg is probably due to including a dorsal spine on third and fourth articles, as it is probable Stuxberg did in the case of *monticola*.

Ethopolys sens. str.

Ethopolys xanti (Wood).

Plate **4**, fig. 1–6.

Bothropolys xanti Wood, Journ. Acad. nat. sci. Phil., 1863, new ser., **5**, p. 15. Trans. Amer. philos. soc., 1865, **13**, p. 152. Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 369. Chamberlin, Can. ent., 1911, **43**, p. 378.

Lithobius xanti Stuxberg, Öfvers. Kongl. vet. akad. Förh., 1875, **32**, no. 3, p. 10, 27. Proc. Cal. acad. sci., 1876, **7**, p. 135. Bollman, Proc. U. S. N. M., 1887, **10**, p. 261. Chamberlin (*ad part. min.*), Proc. U. S. M., 1901, **24**, p. 24. Proc. Acad. nat. sci. Phil., 1902, p. 42. Ann. Ent. soc. Amer., 1909, **2**, p. 190.

Ethopolys xanti Chamberlin, Can. ent., 1912, **44**, p. 173.

DESCRIPTION.— Brown to rusty brown and ferruginous, sometimes very dark, in part suffused with blackish. The head and the first one and usually one to several caudal plates darker and more reddish. Venter and most legs clear brown, the tarsi of the legs more brightly colored, the posterior sternites and legs darker, ferruginous or ferrugineotestaceous. Prosternum and prehensorial feet somewhat ferrugineotestaceous. Antennae usually dark brown, sometimes of a reddish tinge, a little paler at tips.

Body mostly from 8 to 8.6 times longer than width of tenth plate, of nearly same size and proportions in both sexes. Eighth and tenth plates of same width, with the first but little narrower.

Head wider than long in about ratio 73 : 70. Of usual shape, the sides a little converging from behind eyes caudad. Caudal margin straight or very slightly incurved mesally. Anterior margin in form of three convex lines or crenations of which the median is much smaller. Nearly smooth, polished, very finely punctate; the usual distinct, short, transverse submarginal sulcus on each side near marginal break.

Ocelli from ten to eighteen in mostly four rows: *e. g.*, 1 + 5, 5, 4, 2; 1 + 5, 4, 4, 2; 1 + 4, 4, 3, 1; 1 + 5, 4, 3, 1. Single ocellus very large, obliquely elliptical, pale. Seriate ocelli decreasing in size ventrad; series very regular. Organ of Tomösvary a little in front of anterior ocellus of most ventral row and very small in outline.

Antennae long, reaching usually to the eighth segment of body. Articles normally twenty, all long or very long, not densely clothed with rather short hairs.

Prosternum *cir.* 1.67 times wider than long. Chitinous lines incomplete below. Mesal incision narrow and rather deep, the sides a little converging caudad, and the bottom narrowly rounded. Spine acuminate, slender distally as usual, inserted on very anterior edge of diastema in adults. Either two or three teeth normally ectad of diastema. Teeth varying in number from 6 + 7 to 10 + 10 (Plate **4**, fig. 2).

The first, third, fifth, eighth, tenth, twelfth, and fourteenth plates with the usual short submarginal sulcus on each side at about beginning of the caudal third; on the seventh plate a similar impression near each caudal and each anterior corner, the tenth having also a mark at each anterior corner but this absent or obscure on the others. Excepting the first all the dorsal plates are very much roughened with tubercular and rugose elevations. Each major plate excepting the first with a median longitudinal furrow and on each side one running from close to anterior end of this obliquely ectocaudad and further laterad another

furrow subparallel with margin and meeting or crossing the oblique furrow at an acute angle. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced.

Ventral plates with the usual three furrows which are most distinct on the caudal plates, the median mostly deepest, but all, and especially the median, becoming less and less distinct cephalad. On the fifteenth plate the three furrows are very deep and end abruptly in front of the smooth, pilose caudal border which covers about one fourth the length of the plate; the furrows not converging. On the fourteenth plate there is a transverse furrow in front of the caudal border at which the longitudinal furrows, which are less distinct than on the fifteenth, and especially so in the female, terminate or the medium sometimes crossing to the caudal margin.

Coxal pores small, less varying in size than in related species; those of the caudal row frequently but slightly larger than the others, the distal largest. From nine to thirty in number, and mostly in three, but often in four series, the number of pores in the rows not so much differing as usual.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second to the ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 2, 2}$ to $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 2, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{1, 1, 3, 3, 2}$, with two small accessory claws; of the anal, $\frac{1, 0, 3, 1, 0}{1, 1, 3, 2, 1}$, the claw single. Last two pairs of coxae laterally armed.

Anal legs long and slender in both sexes. The third and more distal articles longitudinally sulcate dorsally; ventrally the articles may show a longitudinal furrow each side of middle leaving a broad area between them.

Distal article of male gonopods much narrower than the proximal, long and cylindric in shape, distally broadly rounded; bearing mostly five or six bristles. Proximal article bearing on ventral surface seven or eight bristles.

Claw of female gonopods strongly curved, moderately long, acute, the lateral teeth small and borne well proximad, sometimes almost obliterated. Basal spines 3 + 3 or 4 + 4, or very rarely only 2 + 3 or 2 + 2; stout, conical, decreasing in size mesad on each side; when 4 + 4 the innermost on each side may be attached on mesal side where it is easily overlooked.

Length from 19 to 26 mm. in both males and females. A male 25 mm. long has the eighth and tenth plates 3.1 mm. wide, with the first 3 mm. wide; anal legs 10 mm. long; and the antennae 11 mm. long.

Pseudomaturus (early).— Brown. Head and antennae orange, the latter paler at tips. Legs lighter over tarsi as usual, the anal and penult pairs testaceous or pale ferrugineotestaceous.

Markings of head and dorsal plates fully developed.

Ocelli 1 + 4, 4, 2; 1 + 4, 3, 2. Single ocellus large and elliptic.

Antennae long; composed of twenty long articles as in the *maturus*. Prosternal teeth 2 − 5 + 5 − 2

Coxal pores all small and very small toward, those of caudal side exceeding the more cephalic ones more than in the *maturus*, especially on the coxae with the fewer pores. Mostly from six to twelve in number in two (twelfth coxae) or three rows.

Spines of first to tenth legs, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the eleventh, $\frac{1,0,3,2,2}{0,0,2,3,2}$ or $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$.

Claw shorter and paler, especially proximally, and thinner than in the *maturus*, the lateral teeth about the same. Articles with somewhat fewer bristles. Basal spines 3 + 3, but the most mesal on each side very slender, attached on mesal surface and more dorsad than the others; the median spine relatively somewhat less robust than in *maturus*.

Gonopods of male pale, the basal joint cylindric and the distal one conic. Distal article with one or two bristles, the proximal with two or three.

Length 15–17 mm.

Praematurus.— Light violaceous brown throughout, the head and the first segment and the last several segments darker; dorsal plates usually darker along the caudal and sometimes the lateral borders. Head lighter in front of frontal suture, dusky caudad of suture and about the eyes. Prosternum and prehensors somewhat orange, the latter distally somewhat rufous. Legs and venter paler than dorsum; anal legs rusty yellow.

Ocelli 1 + 4, 3, 2. Distinct; the most ventral much smaller; the single one as usual.

Antennae long. Articles 20, long.

Prosternum with chitinous lines very distinct. Teeth already 2 − 5 + 5 − 2 or 2 − 5 + 6 − 2.

Coxal pores six to eight in two series on each coxa, those of cephalic row few and often minute, sometimes close and nearly merged.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,2,3,1}$; of the second to fourth, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the fifth to tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$.

Claw of female gonopods pale, short and thin; median lobe acute, the lateral plainly indicated. Basal spines 2 + 2; the mesal one on each side slender, acute, and not more than one half the length of the outer one; the outer one moderately stout; both pale.

Gonopods of male with distal article very small, conical, the proximal rounded and narrowed distad; distal articles with one or two bristles, the proximal with two or three.

Length 12–15 mm.

Immaturus.— Pale yellowish brown, with violaceous showing through from beneath. Head and caudal segments pale orange or rusty yellow, the head darker caudad of the frontal suture. Legs pale, light tipped, the last pairs more yellowish.

Ocelli 1 + 4, 3, 1, the one in the most ventral row very small. Single ocellus scarcely larger than adjacent one of first row.

Antennae already with twenty articles, which are long as in the adult.

Prosternal teeth 1 − 5 + 5 − 1. Spine attached a little caudad of edge on ventral surface.

Coxal pores small, with pale margins, four to eight on each coxa in two series.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,2,2,1}$ or $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,1}$ or $\frac{0,0,3,2,1}{0,0,2,3,1}$; of the third to seventh, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the eighth to tenth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{1,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$.

Claw of female gonopods yellow, small, nearly straight, the lateral teeth indicated as acute points near its base. Basal spines 1 + 1, straight, pale.

Length *cir.* 11 mm. (Laurel Canyon, Los Angeles Co., Cal.).

Agenitalis II.— Violet-brown. The frontal region of head pale orange; caudal portion dusky. Legs pale; caudal pairs, especially distally, bright whitish yellow.

Ocelli 1 + 3, 2, the single ocellus equal in size to the adjacent one of the upper row.

The twenty articles of antennae, but few of the articles not already of the full proportionate size.

Prosternal teeth 1 − 5 + 4 − 1, the extra tooth on side having six teeth located on upper part of mesal incision and reduced in size.

Coxal pores from three to five in number; in mostly one, but sometimes in two, series.

Spines of the first legs, $\frac{0,0,1,1,1}{0,0,1,1,1}$ to $\frac{0,0,2,1,1}{0,0,2,2,1}$; of the second to the fifth, $\frac{0,0,2,2,1}{0,0,2,2,1}$; of the sixth to the tenth, $\frac{0,0,3,2,1}{0,0,2,2,1}$; of the eleventh, $\frac{0,0,3,2,2}{0,0,2,2,1}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,3,1}$; of the thirteenth, $\frac{0,0,3,1,1}{0,0,3,3,1}$ or $\frac{0,0,3,1,1}{0,1,3,3,1}$; of the

penult, $\frac{0,0,3,1,1}{0,1,3,3,1}$ or $\frac{0,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{1,1,3,2,1}$. Lateral spines of last two pairs of coxae evident.

Anal glands no longer evident.

Length *cir.* 9.5 mm. (Laurel Canyon, Los Angeles Co., Cal.).

Algenitalis I.— Violaceous. The head in front of suture and the caudal segments yellowish. Legs pale, commonly brighter at tips; caudal pairs from white to yellow. Prehensors yellowish, brighter distad. Antennae violaceous, yellowish at tips.

Ocelli 1 + 2, 2, the more caudal one in each of the two series considerably larger than the anterior one, dusky or brownish in color. Single ocellus not larger than the adjacent one of dorsal row. Organ of Tomösvary minute in outline, well separated from the ocelli.

In antennae of three specimens examined twenty articles are already present; in one specimen seventeen articles are present in right and twenty in left; and in another specimen sixteen are present in right and twenty in left. Articles varying in length, articles short and intermediate in size occurring at intervals.

Coxal pores small and pale margined; two on twelfth coxae, and one each of the others.

Dorsal plates with posterior angles of ninth, eleventh, and thirteenth dorsal plates produced, but those of the ninth only slightly so and the processes distally rounded.

Hairs of body and legs very sparse, the seriately arranged ones of ventral surface of tarsi more numerous.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,1,1}$ or $\frac{0,0,1,1,1}{0,0,0,1,2}$; of the second to sixth, $\frac{0,0,2,2,1}{0,0,0,1,1}$; of the seventh and eighth, $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,1,1}$; of the tenth, $\frac{0,0,2,1,2}{0,0,1,1,1}$; of the eleventh, $\frac{0,0,2,1,1}{0,0,1,1,1}$; of the twelfth, $\frac{0,0,2,1,0}{0,0,1,1,1}$; of the thirteenth, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the penult, $\frac{0,0,0,0,0}{0,0,1,1,1}$, the two accessory claws distinct; of the anal, $\frac{0,0,0,0,0}{1,0,1,1,0}$, the trochanter being without spine or bristle.

Anal glands still manifest.

Length 7–8 mm.

Type Locality.— California (Fort Tejon).

Known Localities.— California (San Bernadino Co.! Los Angeles! Laurel Canyon! Santa Monica! Claremont! Santa Barbara! Monterey! Pacific Grove! Cypress Point! etc., Stanford! Sausalito! Brookdale! Santa Barbara! Santa Cruz Island! etc.). Utah!

This is an abundant species in California along the coast and in the coast mountains from San Francisco to the southern part of the state, where it ranges in part with *E. pusio.* In the Sierras and northward it is replaced by *E. sierravagus* and *E. integer;* while in the Wahsatch Mountains of Utah it is almost wholly replaced by *Bothropolys permundus,* but there maintains a foothold in a number of limited areas.

EXPLANATION OF THE PLATES.

PLATE 1.

PLATE 1.

Bothropolys multidentatus (Newport).

Fig. 1. Part of border of head, showing the continuous lateral margination. (♂ Ithaca, N. Y.).

Fig. 2. Portion of second maxillae showing character of median sinus and membranous bridge.

Fig. 3. ♂ gonopod, lateroventral view. (Kentucky).

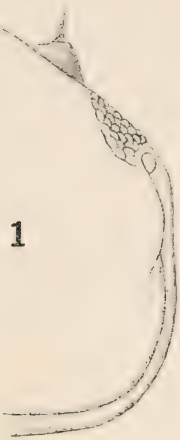
Fig. 4. Claw of ♀ gonopod. (Illinois).

Fig. 5. Basal spines of ♀ gonopod. (Illinois).

Fig. 6. Spine and most ectal tooth of prosternum of adult ♀. (Illinois).

Fig. 7. Same of an adult ♂. (Ithaca, N. Y.).

Fig. 8. Same as an *immaturus* showing relatively greater length of spine. (Illinois).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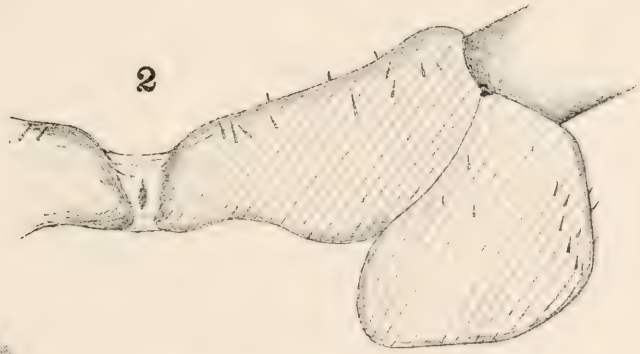
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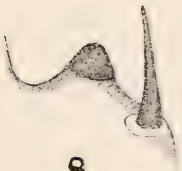
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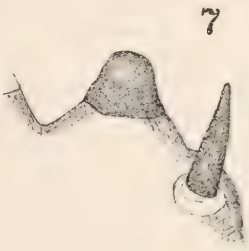
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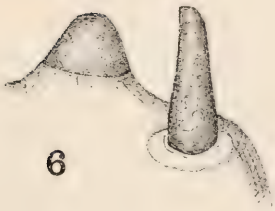
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PLATE 2.

PLATE 2.

Bothropolys permundus (Chamberlin).

Fig. 1. Prosternal teeth and spines of adult, the latter with persistent apical portion. (Provo Canyon, Utah).

Fig. 2. Prosternal spine and outermost tooth of an adult ♂, showing ordinary form of spine in the *maturus*.

Fig. 3. Prosternal spine and outermost tooth of an *immaturus*, showing the tip still present.

Fig. 4. Proximal portion of anal leg in adult, showing ventral coxal spine and coxal pores.

Fig. 5. Same in an *immaturus*, showing the pores still uniseriate.

Fig. 6. Claw of ♀ gonopod, ordinary form.

Fig. 7. Claw of ♀ gonopod with teeth obliterated.

Fig. 8. Basal spines of ♀ gonopod, typical form.

Bothropolys hoples (Brolemann)

Fig. 9. Claw of ♀ gonopod.

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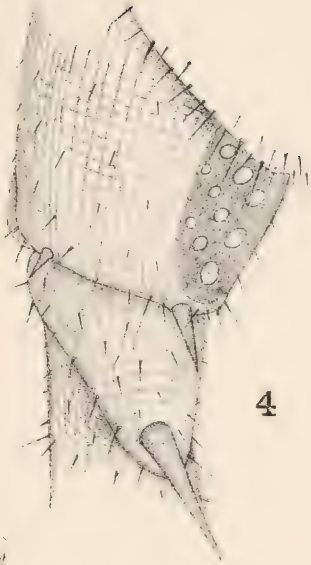

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PLATE 3.

PLATE 3.

Bothropolys hoples (Brolemann).

Fig. 1. Claw of ♀ gonopod, showing teeth practically obliterated. (British Columbia).

Fig. 2. Basal spines of a ♀ gonopod. (Flathead Lake, Montana).

Fig. 3. Same, more robust form. (Portland, Oregon).

Fig. 4. Outline of one side of ninth dorsal plate showing form of posterior process.

Bothropolys victorianus Chamberlin.

Fig. 5. Outline of one side of ninth dorsal plate showing form of posterior process.

Fig. 6. Basal spines of ♀ gonopods. (Type).

Zygethopolys nothus Chamberlin.

Fig. 7. Claw of ♀ gonopods.

Fig. 8. Basal spines of ♀ gonopod.

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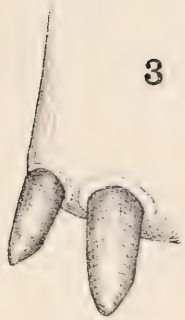
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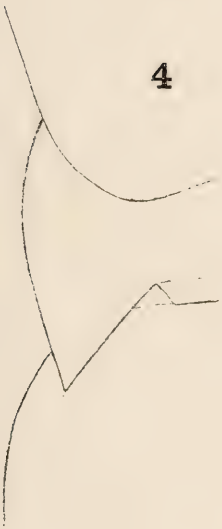
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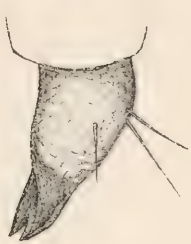
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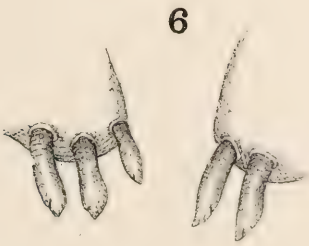
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PLATE 4.

PLATE 4.

Ethopolys xanti (Wood).

Fig. 1. Border of head, showing discontinuity or "break" in lateral margining. (Pacific Grove).

Fig. 2. Prosternal teeth and spine of *maturus*. (Pacific Grove).

Fig. 3. Same of *immaturus*, same magnification as for Fig. 2. (Laurel Canyon).

Fig. 4. Prosternal teeth and spine of left side more highly magnified. (Monterey).

Fig. 5. Basal spines of ♀ gonopod. (Santa Cruz Island).

Fig. 6. Gonopod of ♂. (Pacific Grove).

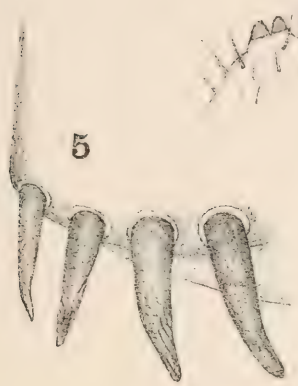
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PLATE 5.

PLATE 5.

Ethopolys sierravagus (Chamberlin).

Fig. 1. Claw of ♀ gonopod. (Shasta Springs, Cal.).
Fig. 2. Basal spines of ♀ gonopod. (Portland, Oregon).
Fig. 3. Terminal portion of an antenna composed of twenty-four articles, showing form of distal articles. (Shasta Springs, Cal.).
Fig. 4. Same of antenna composed of the normal twenty articles. (Shasta Springs, Cal.).

Ethopolys bipunctatus (Wood).

Fig. 5. Claw of ♀ gonopods. (Utah Co., Utah).

Ethopolys integer Chamberlin.

Fig. 6. Terminal portion of normal antenna showing form of distal articles.
Fig. 7. Prosternal spine and teeth of left side.
Fig. 8. Claw of ♀ gonopod. (Pullman, Wash.).

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PLATE 6.

PLATE 6.

Ethopolys integer Chamberlin.

Fig. 1. Outline of right end of thirteenth dorsal plate showing usual form of posterior corner.

Ethopolys integer alaskanus Chamberlin.

Fig. 2. Outline of right end of thirteenth dorsal plate showing form of posterior corner. (Sitka, Alaska).

Ethopolys pusio (Stuxberg).

Fig. 3. Entire gonopod of ♀. (Topotype. Sausalito, Cal.).

Fig. 4. Gonopods of ♂. (Topotype. Sausalito, Cal.).

Fig. 5. Same, right side, of immat., more highly magnified, ectal tooth not yet developed. (Mill Valley, Cal.).

Fig. 6. Prosternal teeth and spine, left side, of *maturus*. (Topotype. Sausalito, Cal.)

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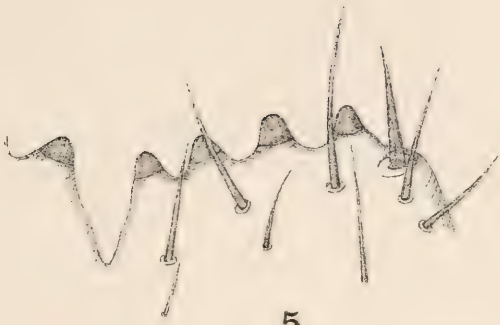

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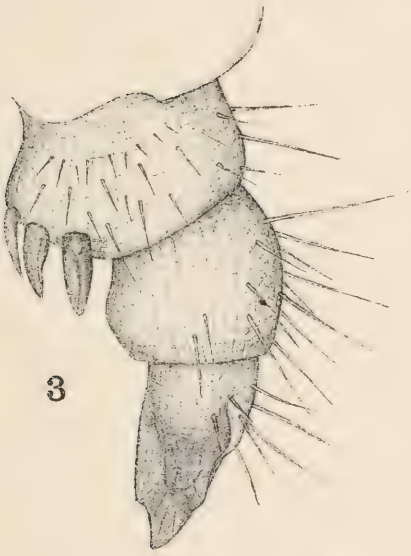

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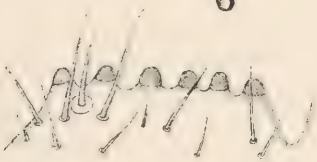

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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
VOL. LVII. No. 8.

THE GENERA LITHOBIUS, NEOLITHOBIUS, GONIBIUS, AND ZINAPOLYS IN AMERICA NORTH OF MEXICO.

BY RALPH V. CHAMBERLIN.

WITH THREE PLATES.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
JUNE, 1925.

No. 8.— *The Genera Lithobius, Neolithobius, Gonibius, and Zinapolys in America North of Mexico.*

By Ralph V. Chamberlin.

The genera revised in this paper include all the species of larger size in the Lithobiidae in the restricted sense occurring in America north of Mexico. In the West and the Southwest these forms seem nearly wholly to be replaced by the similarly large species of the Ethopolidae and Gosibiidae.

The paper was in manuscript in its present form eleven years ago, and is published unchanged excepting for the addition of the description of *Neolithobius helius* Chamberlin, the omission of diagnoses preceding the descriptions, and minor additions to locality records, and bibliography.

Key to Genera.

a. Coxae of last two pairs of legs ventrally armed; (posterior angles of none of the dorsal plates produced); claw of female gonopods entire and the basal spines numerous (*e.g.*, 6+6); articles of antennae 20. . . . . *Zinapolys* Chamberlin.

aa. None of the coxae ventrally armed; posterior angles of three or more of the dorsal plates produced; claw of female gonopods partite, the basal spines 2 + 2 or 3 + 3.

b. Articles of antennae 20. . . . . *Gonibius*, gen. nov.

bb. Articles of antennae more than 20, mostly 25–45.

c. Posterior angles of only the ninth, eleventh, and thirteenth dorsal plates produced; anal legs of male not conspicuously modified. . . . . *Lithobius* Leach (emend.).

cc. Posterior angles of seventh, ninth, eleventh and thirteenth dorsal plates produced; fourth article of anal legs of male specially thickened and with its dorsal surface or else the entire article bowed ventrad.

Neolithobius Stuxberg (emend.).

Zinapolys Chamberlin.

Can. ent., 1912, **44**, p. 14.

Antennae short; articles twenty.

Eyes composed of seriate ocelli. Organ of Tömösvary large in outline.

Prosternal teeth 5 + 5 to 7 + 7, without diastema on each side.

FIG. 1.— Distribution of Zinapolys Chamberlin.

Spine slender, situated caudad of ectal tooth on each side.
Posterior angles of none of the dorsal plates produced.
Coxal pores uniseriate; present on last four pairs of coxae.

Claw of female gonopods strictly entire, deeply excavated on mesal side. Basal spines in type 6 + 6(5).

Gonopods of male large; biarticulate.

Tarsi of all legs bearing three claws.

Coxae of last two pairs of legs armed ventrally and laterally as well as dorsally. Third joint of all legs armed with three dorsal spines. Fifth joint of first thirteen pairs of legs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 1, 1, 3, 3, 1(2). Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral 1, 1, 3, 3, 2. Dorsal spines of twelfth and thirteenth legs 1, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2.

Length of type species 17–20 mm.

Type.— *Z. zipius* Chamberlin.

Outside of the Ethopolidae this is the only known American member of the Lithobiomorpha having any of the coxae ventrally armed. It is unique in the large number of basal spines borne by the female gonopods. The precise affinities of the genus seem at present quite problematical. Only the type species is known.

Zinapolys zipius Chamberlin.

Plate 1, fig. 1–3.

Zinapolys zipius Chamberlin, Can. ent., 1912, **44**, p. 14.

Description.— The original color of types, now largely bleached, seems to have been as follows:— dorsum ferruginotestaceous with the caudal segments somewhat darkest; venter and most of the legs more yellowish, the last pairs of legs darkest, the last ventral plates orange or light ferruginous; prosternum and head nearly like last ventral plates; antennae a little darker than legs but paler than head.

Body narrowed considerably cephalad from the tenth to the second segment and conspicuously caudad as usual. Widths of first, third, eighth, and tenth plates to each other as 19 : 18 : 21 : 21.5.

Head wider than long in about ratio 15 : 13. Anterior margin between antennae nearly straight. Head back of eyes subquadrate, the sides a little converging caudad to the rounded posterior corners. The elevated caudal marginal thickening not widening or extending cephalad at middle. Head depressed along frontal suture. A furrow a little caudad of and parallel with the frontal suture. Commonly a median furrow is present with one diverging from it on each side cephalad from the caudal margin.

Ocelli mostly about twenty in four series: *e.g.*, 1 + 5, 5, 5, 4;

1 + 5, 5, 5, 3. Single ocellus not very large. Organ of Tömösvary large, in outline exceeding an ocellus; not contiguous with eye-patch.

Antennae short, reaching the fifth or the sixth segment; composed of twenty articles of medium or short length, the second one being much the largest and those immediately proximad of the ultimate one often very short. Hairs not dense; longer than usual.

Prosternum wider than greatest length in about ratio 5:3; *i.e.*, 1.66 times wider than long. Anterior margin extending cephalad of ectad from middle on each side Prosternal teeth 5 + 5 to 7 + 7; large, decreasing in size from the most ectal to the most mesal on each side. Spine rather stout at base but acuminate and distally long and slender as shown in the figure.

Major dorsal plates mostly showing a median longitudinal furrow and a little ectad of it on each side one diverging from it from the anterior margin caudad. A depression or wide furrow within each lateral marginal thickening and from the anterior end of this furrow usually a branch extends mesocaudad. A distinct transverse depression a little distance in front of caudal margin, this uniting laterally with the longitudinal furrow on each side. Caudal margin of ninth plate at each end bent obliquely somewhat cephalad; posterior margins of eleventh and thirteenth dorsal plates straight.

Ventral plates with each lateral border bent somewhat ventrad, a furrow marking the line of bending; at least on caudal plates a median longitudinal furrow may be detected. Most plates showing several transverse, irregular impressed lines or furrows of which one or two are ordinarily more pronounced than others.

Coxal pores rather large, very distinct; from circular to transversely elliptic or suboblong in outline; arranged mostly in order 4, 5, 5, 5 or 4, 4, 5, 5.

Gonopods of male moderately large; the proximal article thick, cylindric, with four or five ventral bristles in a transverse row near distal edge Distal article much narrower than the proximal, conical; bearing mostly two or three long bristles.

Claw of female gonopods proportionately short and broad; deeply excavated or hollowed out on mesal side. Basal spines 6 + 6 or 6 + 5; stout but rather short, subconical.

Spines of first to seventh pairs of legs, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of the eighth to eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of the twelfth and thirteenth, $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$; of the penult, $\frac{1,\,0,\,3,\,1,\,1}{1,\,1,\,3,\,3,\,2}$; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{1,\,1,\,3,\,3,\,1}$ or $\frac{1,\,0,\,3,\,1,\,0}{1,\,1,\,3,\,3,\,2(?)}$. All legs with three claws. Last two pairs of coxae laterally armed.

Length 17–20 mm. A male 20 mm. long has the tenth plate 2.8 mm.

wide; the antennae 8 mm. long; and the anal leg (exclusive of coxa as usual) 7.8 mm. long.

LOCALITY.— Idaho: Kootenai Co.!

The types of this interesting species embrace five adults.

GONIBIUS, gen. nov.

Antennae moderate to long; articles twenty.

Ocelli numerous, seriate; single ocellus differentiated.

Prosternal teeth numerous (6 + 6 to 9 + 9). Spine ectal in position. No diastema in dental series of each side.

Posterior angles of fourth, sixth, seventh, ninth, eleventh, and thirteenth, or of only the last three mentioned, dorsal plates produced.

Coxal pores large, uniseriate.

Claw of female gonopods tripartite. Basal spines 2 + 2; broad.

Gonopods of male uniarticulate (*glyptocephalus*).

None of coxae ventrally armed; some of posterior pairs armed laterally as well as dorsally.

Third joint of all legs with three dorsal spines, that of some of anterior ones with but one or two ventral ones, some following with two and only the mere caudal with three. Fifth joint of legs from second or about fourth to thirteenth or fourteenth pairs of legs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 2 to 0, 1, 3, 2, 1; claw one. Dorsal spines of penult legs 1, 0, 3, 2, 2 or 1, 0, 3, 1, 1; ventral 0, 1, 3, 3, 2; claws two or three. Dorsal spines of thirteenth legs 1, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2. Ventral spines of twelfth 0, 0, 3, 3, 2 or 0, 1, 3, 3, 2; dorsal 1, 0, 3, 2, 2 or 0, 0, 3, 2, 2.

Length 18–20 mm.

GENOTYPE.— *Lithobius rex* Bollman.

Of the two species grouped in this genus, one, the type, is known only from the female and the other only from the male, an unfortunate circumstance. Analogy makes it seem likely that the two species should go into separate subgenera on the basis chiefly of the difference in angulation of the dorsal plates, the type constituting Gonibius *sens. str.* while *glyptocephalus* may be included in a new subgenus Tambius.

FIG. 2.— Distribution of Gonibius Chamberlin.

Key to Species.

a. Posterior angles of fourth, sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced; ventral spines of anal legs 0, 1, 3, 3, 2; dorsal spines of penult legs 1, 0, 3, 2, 2.
G. (*Gonibius*) *rex* (Bollman).

aa. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced; ventral spines of anal legs 0, 1, 3, 2, 1; dorsal spines of penult legs 1, 0, 3, 1, 1.

G. (Tambius) glyptocephalus (Chamberlin).

Gonibius rex (Bollman).

Plate 1, fig. 4, 5.

Lithobius rex Bollman, Proc. U. S. N. M., 1888, **11**, p. 350. Bull. **46**, U. S. N. M., 1893, p. 102.

Description.— Original color difficult to make out from type. Apparently greyish brown with head, antennae, and the first dorsal plate and margins of the others darker. Legs light brown or testaceous.

Body robust, in the type being at present only 6.25 times longer than the width of the tenth plate (while the body may have shrunk through drying, the length of 25 mm. given by Bollman in the original description was doubtless too large, as seems to have been true of most measurements given by that author for lithobiids). Widths of head and of first, third, eighth, and tenth plates to each other as 88 : 80 : 76 : 88 : 88.

Head distinctly wider than long (ratio 11 : 9), considerably wider than first dorsal plate but same as width of eighth and tenth plates. Caudal margin nearly straight. Surface uneven, densely, finely punctate.

Ocelli 18–21 in four or five series: *e.g.*, 1 + 5, 5, 4, 3(4), 1 + 5, 6, 5, 3, 1. Single ocellus large, subcircular. Other ocelli also comparatively large and distinct, those of the most dorsal row being largest as usual.

Antennae long, reaching well upon the tenth body segment. Composed of twenty articles all of which are long or very long.

Prosternum about 1.87 times wider than long. Distance between chitinous spots only 1.25 times width at level of bottom of median sinus; two times the length of the dental line. Teeth rather small, nearly uniform, distally narrowly rounded, 9 + 9 in number. Anterior margin wide; each side weakly convex, with mesal end a little farther caudad than the ectal. Spine ectal in position as usual, slender and straight, acute.

First dorsal plate like head; the others very strongly roughened. Posterior angles of the fourth, sixth, seventh, ninth, eleventh, and

thirteenth dorsal plates strongly produced, those of the last three mentioned being especially long and acute.

Coxal pores large, strongly transverse, being narrowly oblong or sometimes keyhole shaped : 8, 8, 8, 7.

Claw of female gonopods short and broad; tripartite, the two more mesal lobes nearly equal in length with the median one but little the longer, the ectal lobe smallest. Basal spines 2 + 2, very wide, somewhat clavately widening to distal third which is abruptly narrowed to an acute point (Plate **1**, fig. 5). Mesal side of proximal article straight or nearly so.

Anal legs of female long and slender, the distal articles especially slender. Fifth article or tibia much longer than the fourth article or femur. Ratio of lengths of fourth, fifth, sixth, and seventh articles being to each other as 66 : 79 : 65 : 40.

Spines of first and second legs, $\frac{0,0,3,2,1}{0,0,1,3,2}$; of the third either the same or $\frac{0,0,3,2,2}{0,0,1,3,2}$; of the fourth, $\frac{0,0,3,2,2}{0,0,1,3,2}$; of the fifth to eighth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the thirteenth and fourteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; the latter with three claws of which the anterior accessory is very small; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,2}$, claw one. Last four pairs of coxae laterally armed.

Length of type (♀) 20 mm.; width of tenth plate 3.2 mm.; length of antennae 13 mm.; length of anal legs 12 mm.

Locality.— Georgia: Tallulah!

Only the single type female above described is known.

Gonibius (Tambius) glyptocephalus (Chamberlin).

Lithobius glyptocephalus Chamberlin, Proc. Acad nat. sci. Phil., 1903, p. 35.

Description.— Dorsum more or less chestnut with a median longitudinal pole stripe. Head more reddish, paler along margins and frontal suture. Antennae reddish brown, paler distad. Prosternum and prehensors brown, the latter somewhat paler ectad. Venter light brown, the caudal plates darker. Legs testaceous, the caudal pairs darker.

Body about seven times longer than the width of the tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 65 : 64 : 59 : 65 : 65. The head is thus equal in width to the eighth and tenth plates as in *G. rex*.

Head wider than long in about ratio 13 : 12. The short transverse sulcus near each marginal break is deep with its mesal end curving

cephalad. A short sulcus extending mesocaudad from above eye on each side. A short but well-impressed transverse sulcus a little in front of median portion of caudal margin. A median longitudinal furrow on caudal portion with another one each side of it may be traced. Head a little elevated immediately cephalad of frontal suture, and on this elevation a median pit-like depression. Surface appearing smooth and shining, being only obscurely uneven and punctate. Margining continuous forward to the eyes but the thickening narrower cephalad of the lateral break. Head widest a little caudad of the eyes from where the sides converge to the caudal corners.

Ocelli mostly near fifteen in three series: *e.g.*, 1 + 5, 5, 4; 1 + 5, 5, 3; 1 + 7, 6, 4; 1 + 5, 5, 5. Single ocellus large, obliquely oval. The patch elongate.

The antennae moderate in length, reaching upon the seventh body segment. Articles normally twenty, but may number up to twenty-three on one side; slender and long; the ultimate long and pointed.

Prosternum a little less than 1.6 times wider than long. Distance between chitinous spots about 1.9 times width at level of bottom of sinus; 2.5 times dental line. Teeth mostly 6 + 6 or 7 + 7; stout, acute, decreasing in size and extent of separation mesad. Spine a little ectad and caudad of ectal tooth; bristle-like distad.

First dorsal plate nearly like head, but obscurely uneven, while the other plates are more markedly rugose and subgranulose, the caudal ones, as usual, most so, though none of them are strongly so. The major plates with a short submarginal sulcus on each side at about one third the length from the caudal margin and also a second similar one toward anterior end, there most conspicuous on more posterior plates. A pair of diverging longitudinal sulci on plate with a wider median furrow between them; on each side a more ectal furrow parallel with margin and usually uniting with the oblique sulcus near its middle.

First ventral plate broadly mesally depressed, a sharply impressed median longitudinal sulcus crossing the broader depression. Other plates showing three distinct longitudinal furrows of which the median one on some of the posterior plates may become shortened and even pit-like. Hairs sparse, most abundant on the caudal plates.

Coxal pores rather large, subcircular or transversely elliptic: in number, *e.g.*, 6, 7, 7, 6–6, 7, 8, 8.

Gonopods of male well exposed; broad, distally subtruncate; bearing six or seven bristles.

Gonopods of female with claw tripartite, the lateral lobes relatively much reduced. Basal spines 2 + 2; stout, clavately widening above base.

Anal legs in the male moderately long; slender. Neither the anal nor the similarly slender penult legs bearing any special lobes or furrows.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second to the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 3, 2}{0, 1, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; claws two, of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1} - \frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claw one. Last three pairs of coxae laterally armed.

Length 18–22 mm. A male 18 mm. long has anal legs (exclusive of coxae) 9 mm. long; antennae 9 mm. long; and tenth plate 2.6 mm. wide.

Type Locality.— New Mexico: Beulah!

Known Localities.— New Mexico: Beulah! Chicario Canyon near Raton! Las Vegas! (T. D. A. Cockerell).

Lithobius Leach (emend.).

Trans. Linn. soc. London, 1815, **11**, p. 381.

Lithobius (*ex part*) Gervais, Hist. nat. ins. Aptères, 1847, **4**, p. 229. Newport, Cat. Myr., 1856, p. 2, 15. Meinert, Nat. tiddskr., 1868, **5**, p. 258. Latzel, Myr. Österreich-Ungar. monarch., 1880, **1**, p. 31. Verhoeff Bronn's Thierreich, 1907, **5**, p. 239.

Antennae varying in length in ours from short to moderately long articles always more than twenty, and in American species under fifty, being mostly from twenty-five to forty-five.

Seriate ocelli present, mostly numerous. Single ocellus clearly differentiated.

Prosternal teeth $5 + 5$ to $10 + 10$, or rarely but $4 + 4$. Spine ectal in position, slender. No diastema in dental line of each side.

The ninth, eleventh, and thirteenth dorsal plates with posterior angles produced.

Coxal pores uniseriate, circular or, as mostly, transverse; present on last four pairs of coxae.

Claw of female gonopods tripartite. Basal spines $2 + 2$ or $2 + 3$.

Gonopods of male mostly uniarticulate, but they may be biarticulate.

None of coxae armed ventrally; some of posterior pairs armed dorsally and usually, but not always (*e.g.*, *L. forficatus*), armed laterally.

Third joint of all legs armed with three dorsal spines. Fifth joint of legs from first or second to eleventh or in most to thirteenth and sometimes to fourteenth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0 (or very rarely varying to 1, 0, 3, 1, 1 or 1, 0, 3, 2, 0

FIG. 3. — Distribution of Lithobius Leach.

in *L. forficatus*, (according to Latzel); ventral 1, 3, 3, 1 or 1, 3, 3, 2; claws one or two. Dorsal spines of penult legs 1, 0, 3, 1, 1 or 1, 0, 3, 2, 2; ventral mostly 0, 1, 3, 3, 2, less commonly 0, 1, 3, 3, 1 or 0, 1, 3, 3, 3. Dorsal spines of twelfth and thirteenth legs 1, 0, 3, 2, 2 to 1, 0, 3, 1, 1 or coxal spine of twelfth missing.

Posterior legs of male essentially unmodified, not lobate or of conspicuously different form.

Length of our species 11.5–30 mm., mostly above 15 mm.

GENOTYPE.— *L. forficatus* (Linné).

In common with the other genera discussed in this paper and, in fact, with all members of the Lithobiidae as restricted by the author, the mouthparts of Lithobius have the following characteristics: —

Labrum tridentate, a large median one in the sinus and a smaller one on each side. Laterally the labrum is clothed along margin and over border on the dorsal side with numerous bristles which are in large part ramose or laciniate, but in part are simple.

The first maxillae have the outer branch biarticulate; distal article of this branch densely clothed with simply ramose hairs. Inner branch undivided; set off by a suture from the coxal division; densely clothed over the distal portion with simply ramose hairs similar to those of the outer branch.

Second maxillae with claw of palpus normally five partite. Distal article complanate dorsomesally and clothed over this area with many penicillate and ramose setae similar to those of the first maxillae. Palpus triarticulate with the usual traces indicating two additional proximal articles. Coxosternum commonly with the median portion curved caudad and also bent dorsad; less strongly chitinized than the lateral portions which it widely separates.

The distribution of the genus in North America is shown in Figure 3. It is rare in the Pacific Coast region and in the Southwest, where it is represented by but a single known species, *L. chumasanus* Chamberlin.

Key to Species of Lithobius.

a. None of the posterior coxae laterally armed . . *L. forficatus* (Linné).

aa. Coxae of the last three pairs of legs laterally armed.

b. Claw of anal legs single.

c. Penult legs with the claw single; dorsal spines of thirteenth legs 1, 0, 3, 1, 1 . . . . . *L. atkinsoni* Bollman.

cc. Penult legs with three claws; dorsal spines of thirteenth legs 1, 0, 3, 2, 2 . . . . . *L. celer* Bollman.

bb. Anal leg with two claws.

c. Ventral spines of anal legs 0, 1, 3, 3, 1.
L. chumasanus Chamberlin.

Lithobius forficatus (Linné).

Plate 2, fig. 1–3.

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Lithobius multidentatus Wood (*non* Newport), Journ. acad. nat. sci. Phil., 1863, n.s., **5**, p. 13.
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Description.— In general color varying from brownish yellow to chestnut; dorsal plates showing often. A median dorsal paler line, as also sometimes an oblique line on each side. Head brown to chestnut like the dorsum, with the frontal region sometimes paler. Antennae brownish yellow to chestnut, the tip usually rufous. Prosternum somewhat paler than the head but darker than the venter; prehensors mostly rufous or pale ferruginous distally. Venter brownish yellow to brown; frequently dusky, with the most caudal plates reddish to subferruginous.

Body widest at tenth segment; very gradually narrowing cephalad and more decidedly so caudad as usual. Widths of first, third, eighth, and tenth dorsal plates to each other as 54 : 52 : 57 : 59.

Head a little wider than long (*ca.* 24 : 23); the portion caudad of eyes subquadrate, the sides a little converging caudad of the marginal breaks. Caudal margin slightly incurved mesally. Immediately in front of median portion of caudal marginal thickening a curved sulcus, the free ends of which appear as diverging shallow furrows; this impression sometimes very vague, at others distinct. Surface somewhat uneven; punctate, the puncta being usually more distinct and dense in the frontal region.

Ocelli twenty-two to forty, but mostly twenty-six to thirty-four; in five to eight series, but mostly in six. Single ocellus large, sub-

FIG. 4. — Distribution of Lithobius forficatus (Linné).

circular to oval in outline. Seriate ocelli closely arranged but those of the most dorsal one or two rows often with ocelli somewhat separated, especially so the more caudal ones. Examples of arrangement are as follows: 1 + 6, 6, 6, 6, 5, 3; 1 + 4, 5, 5, 5, 4, 2; 1 + 5,

5, 7, 7, 5, 4; 1 + 5, 6, 6, 5, 4, 3; 1 + 5, 6, 6, 6, 4, 3; 1 + 7, 7, 8, 7, 5, 3; 1 + 3, 6, 6, 5, 5, 4, 3.

Antennae short, normally reacting at most to the anterior portion of the seventh segment, consisting of from thirty-six to forty-nine articles, but the number mostly from thirty-nine to forty-five of which those between the second and ultimate are short and very short and closely compacted. Hairs dense, short, straight.

Prosternum wide, being mostly nearly 1.7 times wider than long. Anterior portion narrowed considerably cephalad; anterior margin a little convexly curving from each end to the median sinus. Teeth a little more widely separated ectally than toward median line; stout, moderately subacute: 5 + 5; 5 + 6; 6 + 6; 6 + 7; 7 + 7. Spine in usual position at ectal end, a little caudad of most ectal tooth; slender (Plate 2, fig. 1).

Dorsal plates well arched; surface but little uneven, appearing mostly smooth and shining; the short submarginal transverse impressions or sulci near beginning of caudal third of length commonly weak or obscure. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced, the processes stout and subacute.

Ventral plates with a longitudinal median sulcus, which is more distinct on the caudal ones. A transverse sulcus on caudal portion of plate which is commonly obscure on anterior plates. In addition there is a weakly impressed line or furrow running obliquely ectocephalad on each side from near the junction of the two previously mentioned sulci, these oblique lines being most distinct on the last plate where they unite at the median furrow, with the caudal portion of which they compose a Y-shaped impression. Caudal plates and genital segment more densely pilose than the others.

Coxal pores large, strongly transversely elongate, the most proximal ones on each coxa smaller and often subcircular; the most distal one mostly distinctly broader distoproximally, broadly elliptic to circular. Sometimes all pores are elliptic or almost circular as is normal in immature specimens. Examples of arrangement: 6, 6, 6, 5; 7, 8, 8, 6; 8, 8, 8, 8; 8, 10, 10, 7; 9, 10, 10, 7; 10, 9, 9, 8; 8, 10, 10, 7; 9, 10, 9, 6; 11, 11, 10, 10; 12, 12, 10, 10.

Gonopods of male biarticulate; first article broad, bearing 4–6 bristles; second article small and wart-like or broadly subconic, usually with a single long bristle.

Claw of female gonopods short and rather wide; the three lobes mostly blunt, the median considerably exceeding the lateral ones which are subequal, but these always well developed (Plate 2, fig. 2).

Basal spines 2 + 2 or 2 + 3, stout, in outline subconical (Plate 2, fig. 3).

Posterior legs rather short, slender, being only slightly thickened. Femur of anal and penult legs with two parallel and rather weak, longitudinal furrows along the dorsal surface; the prefemur similarly but more indistinctly furrowed. Wholly without special lobes or modifications in the male.

Spines of first three pairs of legs, $^{0,\ 0,\ 3,\ 2,\ 2}_{0,\ 0,\ 2,\ 3,\ 2}$; of fourth to eighth pairs the same or $^{0,\ 0,\ 3,\ 2,\ 2}_{0,\ 0,\ 3,\ 3,\ 2}$; of the ninth to eleventh, $^{0,\ 0,\ 3,\ 2,\ 2}_{0,\ 0,\ 3,\ 3,\ 2}$; of the twelfth, $^{1,\ 0,\ 3,\ 1,\ 2}_{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $^{1,\ 0,\ 3,\ 1,\ 1}_{0,\ 1,\ 3,\ 3,\ 2}$; of the penult, $^{1,\ 0,\ 3,\ 1,\ 1}_{0,\ 1,\ 3,\ 3,\ 2}$, claws three, the anterior accessory being minute; of the anal, $^{1,\ 0,\ 3,\ 1,\ 0}_{0,\ 1,\ 3,\ 3,\ 2}$, claw single.

Length 18–30 mm.; width of tenth plate 2.25 to 3.5 mm. A ♂ 22.5 mm. long has the tenth plate 2.8 mm. wide; antennae 10 mm. long and anal legs (exclusive of coxae) 9.6 mm. long.

Pseudomaturus.— Coloration like that of paler adults. From light to dark brown; head darker brown to light mahogany. Antennae like head, except at tips which are pale and usually rufous. Venter and legs paler brown; the caudal pairs of legs mostly darker than the others, often rufous distad.

Antennae reaching from the fifth to seventh segment. Articles in specimens examined varying from thirty-six to forty-four.

Ocelli mostly in five series and twenty to twenty-four in number: *e.g.*, 1 + 3, 6, 6, 5, 3; 1 + 6, 6, 5, 4, 3; 1 + 5, 5, 4, 4, 3; 1 + 4, 5, 6, 4, 2.

Prosternum as in *maturus*. Teeth mostly 5 + 5.

Coxal pores 5, 6, 6, 5; 6, 6, 7, 6.

Gonopods of male biarticulate; distal article in younger specimens glabrous, in older ones with one bristle and the first article mostly with two.

Claw of female gonopods nearly as in adult, but a little thinner and somewhat shorter and paler with the teeth or lobes rather more acute. Spines about as in *maturus* or the mesal one of each pair in smaller specimens may be relatively shorter.

Spining of legs as in *maturus* excepting that the dorsal spines of first legs are prevailingly 0, 0, 3, 2, 1 instead of 0, 0, 3, 2, 2 and the ventral spines of the ninth legs are more commonly 0, 0, 2, 3, 2 instead of 0, 0, 3, 3, 2, a formula in the adults also commonly holding as well for a number of the more anterior legs.

Length 14–18 mm. A ♂ 16.5 mm. long has antennae and anal legs both very near 6 mm. in length. (Watersmeet, Mich.).

Praematurus.— Pale brownish yellow to light brown, the caudal

segments, especially in pale specimens, darker. Head and antennae usually a darker brown with the frontal region frequently paler and the antennae lighter at tips. Venter and most of the legs paler than the dorsum, the caudal plates and legs darker, the latter with tarsi often rufous. Prosternum a darker brown than the venter; the prehensors rufous distally.

Antennae reaching fifth body segment. Articles thirty-four to thirty-eight.

Ocelli twelve to nineteen in three or four series: *e.g.*, 1 + 5, 6, 4, 3.

Prosternal teeth 4 + 4 or 5 + 5.

Coxal pores from circular to broadly elliptic: in number mostly 5, 5, 5, 4. Porigerous area only slightly depressed.

Gonopods of male biarticulate, the distal one small and glabrous, the proximal one with usually but one bristle.

Claw of female gonopods short, moderately curved, thin and pale; the three lobes distinct, acute. Spines 2 + 2; the inner one of each pair much smaller than the outer, being only about one half as long and less than half as broad. Bristles more sparse than in the *pseudomaturus*.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,2,3,1}$ to $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,2}$ to adult number; of the third and fourth, $\frac{0,0,2,3,1}{0,0,2,3,2}$ to adult number; of the fifth and sixth, $\frac{0,0,2,2,2}{0,0,2,3,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the seventh to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$, or ventral spines of tenth and eleventh may be 0, 0, 3, 3, 2, and in one specimen ventral spines of eleventh on one side were 0, 0, 2, 2, 2; of the remaining four pairs as in the older stages.

Length 11 to 13.5 mm. A ♀ 13.5 mm. long has antennae 5 and anal legs 5.5 mm. long.

Immaturus.— Brownish yellow to light brown, the caudal segments, especially in paler specimens, darker. Head usually a little darker than dorsum with frontal region paler, often yellowish. Antennae usually of same color as frontal region of head. Venter and legs pale with caudal plates darker; tarsi of last pairs of legs often pale rufous, the whole body in life may be suffused more or less with a violaceous color.

Antennae composed of twenty-nine to thirty-six articles, of which the first three are long and the others mostly short, but commonly showing longer ones at intervals.

Ocelli ten to eighteen in three or four series: *e.g.*, 1 + 4, 4, 3; a common arrangement: 1 + 5, 5, 4, 3. Single ocellus large, elliptic.

Prosternal teeth nearly always 4 + 4; rarely 5 + 5.

Coxal pores all circular or in larger specimens transversely somewhat elliptic: mostly 4, 4, 4, 3, but varying from 3, 3, 3, 3 to 4, 4, 4, 4.

Male gonopod appearing as a small rounded tubercle, often concealed, which is undivided and may bear a single bristle; or in some a trace of the second article.

Claw of female gonopods small, pale, appearing at most as a small acute spine without trace of lateral lobes or in smallest specimens claw wholly absent and then often only two articles developed in gonopod. Basal spines 1 + 1 or occasionally with the merest trace of a second one on one side; pale, often appearing as mere points. The second and third articles may be entirely glabrous or the second may have two or three and the third one or two bristles, the first having from one to four.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,2,1}$ to $\frac{0,0,2,1,1}{0,0,2,2(3),1}$; of the second, $\frac{0,0,2,2,1}{0,0,2,2,1}$ or with ventral spines 0, 0, 2, 3, 2; of the third, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or ventral spines to 0, 0, 2, 3, 2; of the fourth, $\frac{0,0,2,2,1}{0,0,1,2,1}$ to $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the fifth and sixth, $\frac{10,0,2,2,2}{0,0,2,2,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the seventh, $\frac{0,0,3,2,2}{0,0,2,3(2),2}$; of the eighth and ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or ventral spines 0, 0, 3, 3, 2; of the twelfth, $\frac{1(0),0,3,1,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,3,3,2}$, $\frac{0,0,3,1,1}{0,1,3,3,2}$ or $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,2,1,0}{0,1,3,3,1(2)}$ to $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,1,1,0}{0,1,2,2,1}$, $\frac{1,0,2,1,0}{0,1,3,2,1}$ to $\frac{1,0,3,1,0}{0,1,3,3,2}$.

Length 9–11 mm. A ♂ 10.5 mm. long has antennae 5 mm. and anal legs 3 mm. long. (Watersmeet and Marinette, Mich.).

Agenitalis II.— Dorsum pale; dilute brownish to pale testaceous. Head light brown, the frontal region lighter. Venter and legs a little paler than dorsum, the caudal segments usually darker. In life the entire body is suffused with violaceous.

Articles of antennae twenty-five to thirty-three; those distad of the third varying considerably in size in different individuals, often submoniliform.

Ocelli nine to twelve in two to four series: *e.g.*, 1 + 2, 3, 2; 1 + 4, 3, 1; 1 + 4, 3, 2; 1 + 4, 4, 2; 1 + 4, 3, 2, 1; 1 + 5, 4. Ocelli pale. Single ocellus much largest, elliptic.

Prosternal teeth by far most frequently 4 + 4; occasionally 4 + 5 or 5 + 5.

Coxal pores 2, 3, 3, 2–2, 2, 2, 2; circular.

Gonopod of male very small, glabrous; commonly wholly concealed.

Gonopods of female appearing as subcylindric processes which are undivided and entirely glabrous.

Spines of first legs, $\frac{0,0,1,1,0(1)}{0,0,2,2,1}$ to $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the second and third, $\frac{0,0,1,2,1}{0,0,1,2,1}$ to $\frac{0,0,0,2,2,1}{0,0,0,2,2,1(2)}$; of the fourth, $\frac{0,0,0,2,2,1}{0,0,0,2,2,2}$; of the fifth, $\frac{0,0,0,2,2,2}{0,0,0,2,2,2}$; of the sixth the same to $\frac{0,0,0,3,2,2}{0,0,0,1,2,1}$; of the seventh, $\frac{0,0,0,3,2,2}{0,0,0,1,2,1}$ to $\frac{0,0,0,3,2,2}{0,0,0,2,2,2}$; of the eighth and ninth, $\frac{0,0,0,3,2,2}{0,0,0,1,2,2}$ to $\frac{0,0,0,3,2,2}{0,0,0,2,2,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,2,2}$ to $\frac{0,0,0,3,2,2}{0,0,0,2,3,2}$; of the twelfth, $\frac{0,0,0,3,1,1}{0,0,0,3,3,2}$ to $\frac{0,0,0,3,1,2}{0,0,0,2,3,2}$[1]; of the thir-

[1] In a regenerated leg of one specimen the formula is $\frac{0,0,1,0,0}{0,0,1,1,1}$.

teenth, $\frac{0,0,2(3),1,1}{0,0,2,2,2(1)}$ to $\frac{0,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{0,0,3,1,1}{0,1,3,3,1}$ to $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{0,0,2(3),1,0}{0,1,3,3,1}$ to $\frac{1,0,3,1,0}{0,1,3,2,1}$.

Length 7–9 mm. A specimen 7.5 mm. long has antennae 3.25 mm. and anal legs about 2.8 mm. long. (Watersmeet, Mich., July, 1910).

Agenitalis I.— Very pale in color. Violaceous in life.

Articles of antennae twenty-one to twenty-seven; those distad of the third short, moniliform.

Ocelli five to seven in two or occasionally in three series: *e.g.*, 1 + 3, 2, the commonest formula; 1 + 2, 2; 1 + 2, 2, 1; 1 + 3, 3. Pale. The single ocellus and the caudal one of top series larger than the others.

Prosternal teeth mostly 4 + 4; more rarely 3 + 4 or 3 + 3.

Coxal pores 1, 1, 1, 1, each toward distal end of its coxa, to 1, 1, 1, 2 and 2, 1, 1, 1. Moderate in size, pale edged.

Anal glands still distinct and rather large.

Caudal angles of ninth, eleventh, and thirteenth dorsal plates produced, but the processes short and somewhat rounded.

Gonopods not evident in either sex.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$ or $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the second, $\frac{0,0,1,1,1}{0,0,0(1),1,1}$ to $\frac{0,1,2,1}{0,0,1,1,1}$; of the third and fourth, $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the fifth and sixth, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the seventh and eighth, $\frac{0,0,2(1),2,1}{0,0,1,2,1(2)}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,2,1(2)}$; of the tenth, $\frac{0,0,3,2,2}{0,0,1,2,1(2)}$; of the eleventh, $\frac{0,0,2,1,2}{0,0,1,2(1),1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the thirteenth, $\frac{0,0,0,0,0}{0,0,1,1,1}$; of the penult the same or $\frac{0,0,1,0,0}{0,0,2,1,1}$; of the anal, $\frac{0,0,0,0,0}{0,0,1,1,1}$.

Length 6–7 mm. (East Peoria, Ill., July, 1910).

Pullus IV (Larva IV).— Very pale testaceous to dilute ferruginous, with head and antennae a little darker.

Antennae composed of twenty-one to twenty-two short articles, moniliform.

Ocelli three to five in two series: *e.g.*, 1 + 1, 1; 1 + 2, 1; 1 + 2, 2.

Prosternal teeth mostly 4 + 4 with the most mesal one on each side very small; occasionally 4 + 5, or 3 + 3.

A single pore on each coxa of twelfth legs.[1]

Anal glands large, distinct.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the second to the fourth, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the fifth, $\frac{0,0,1,2,1}{0,0,0,1,1}$; of the sixth, $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the seventh, $\frac{0,0,2(0),2,2}{0,0,1,1,1}$; of the eighth, $\frac{0,0,2(1),1,2}{0,0,1,1(2),1}$; of the ninth, $\frac{0,0,2,1,1}{0,0,1,1(2),1}$; of the tenth, $\frac{0,0,2,1,1}{0,0,1,2,1}$; of the eleventh and twelfth, $\frac{0,0,0,0,0}{0,0,1,1,1}$.[2]

[1] Sometimes older specimens are met with in which the thirteenth legs are considerably farther developed than the fourteenth and fifteenth. In such there may be a pore present on each thirteenth coxa as well as on the twelfth (larva *media*).

[2] The first dorsal spine to appear on distal end of tibia of legs caudad of the eighth is on the

Last three pairs of legs appearing as pale buds.

Length, 5–6 mm.

Pullus III (Larva III).— In this stage ten dorsal plates are developed with ten pairs of functional legs, two additional pairs of legs appearing as buds caudad of the tenth segment.

Antennae with sixteen to eighteen articles (mostly the larger number).

Ocelli mostly 2 or 3: *e.g.*, 1 + 1; 1 + 1, 1.

Prosternal teeth mostly 3 + 3; sometimes 2 + 2.

Length 4–5 mm.

Pullus II (Larva II).— Very pale yellowish.

Eight dorsal plates and eight pairs of developed legs present, two additional pairs appearing as buds.

Articles of antennae fourteen.

Ocelli two or three: 1 + 1; 1 + 1, 1.

Prosternal teeth 2 + 2 or 3 + 3 (rarely 4 + 4, in which case the most mesal on each side is minute).

Length 3–4 mm.

Pullus I (Larva I).— Individuals as they escape from the egg envelopes are pale yellowish white and are translucent.

Seven dorsal plates and seven developed pairs of legs are present, with three additional pairs of legs appearing as buds.

Articles of antennae twelve in number; moniliform.

Ocelli two, distinct; 1 + 1. The second ocellus represents the first one of the upper series proper and from this the formation of the others, which are always smaller, proceeds in the later stages.

Prosternal teeth 2 + 2, very small and often indistinct.

Length 3–4 mm. (East Peoria, Ill., July, 1910).

Type Locality.— Europe.

North American Localities.— Idaho: Pocatello! Utah: Logan! Willard! Ogden! Salt Lake City! Provo! Lake Point! etc. Colorado: Denver! Colorado Springs! North and South Dakota! Iowa: Mongona! Boone! DeWitt! Marshalltown! Taura! Ogden! etc. Nebraska: Omaha! Columbia! Fremont! Grand Island! etc. Kansas: Manhattan! Topeka! Cowley Co. (H. Gunthorp); Labette Co. (R. D. Lindsey); Sumner Co. (W. O. Riley). (Southern limit of species which there seems to be scarce). Minnesota: Winona! Minneapolis! Wisconsin: Janesville! Beloit! Kimballs! Fond du Lac! Marinette!

caudal side while on those cephalad of the seventh it appears on the cephalic side. When but one spine occurs in the adult on the dorsal surface of the tibia it is, of course, in the position indicated. Likewise, the first dorsal spine to appear on the femur of the anterior legs appears on the cephalic side, but on the posterior pairs in the caudal position.

Eau Claire! Hangen! Devil's Lake! etc. Exceedingly abundant throughout the state. Illinois: Peoria! Franklin Grove! Dwight! Sterling! Urbana! (C. C. Adams) Chicago! etc. Missouri: St. Louis! Michigan: Watersmeet! Powers! Menonimee! Ludington; Ann Arbor! Detroit! Douglas Lake! etc. (Apparently abundant throughout the state). Indiana: Lawrenceburgh! Greencastle! Connersville! Westfield! Bloomington! (Common in northern part of state, scarce in the southern). Ohio: Columbus! Cleveland! (Probably common across northern portion of state). New York: Syracuse! Niagara! Penn Yan! Hornell! Ithaca! New York City! Long Island! etc. Pennsylvania: Philadelphia! Harrisburg! etc. New Jersey: Camden! Newark! etc. Maryland: Baltimore! District of Columbia! Virginia: Lynchburg! Balcony Falls! West Virginia: White Sulphur! Kentucky: Bee Spring (F. G. Sanborn) Lexington! Covington! North Carolina: Asheville! Hot Springs! South Carolina: Greenville! Connecticut: New Haven! Rhode Island! Massachusetts: Cambridge! Arlington! Forest Hills! Blue Hills! Wellesley! Malden! Danvers! Springfield! Lowell! Wood's Hole! Cohasset! (Very common throughout the state). Vermont: Brattleboro! Townshend! Jamaica! Hartford! Berkshire! New Hampshire: Lake Winnepesaukee! Fabyans! Intervale! Amherst! etc. Maine: Bangor! Hampden! Orono! Brooklin! Head Island! Old Orchard! Portland! Vinal Haven Island! Bar Harbor! Near Mt. Katahdin! Ontario: London! Toronto! Belleville! OHawa! St. Joseph's Island! Quebec: Montreal! Anticosti Island! Amherst! and Coffin Island! Nova Scotia: Halifax! Ship Harbor! (Arethusa Exped.) Yarmouth! McNair Cove! Cape Breton! Newfoundland!

This species occurs throughout most of Europe. In North America it occurs in Canada and across the northern United States from the Rocky Mountains to the Atlantic as shown in Figure 3. In New England and the northern tier of the United States the species is very abundant and almost wholly replaces other large forms, *e.g.*, in Wisconsin. In the southern part of the range indicated in the figure it becomes scarce, as in southern Indiana, Missouri, and Kansas. In the East the range is carried southward along the mountains as far as North and South Carolina where, however, it seems to be scarce. In Utah it occurs only in and near settlements and cities and does not occur native in the canyons, etc. In the southeastern states it is replaced chiefly by the several species of Neolithobius (Figure 5).

Lithobius celer, a species of very similar appearance, occurs in Arkansas and is probably the form Wood reported from that state under the name *L. americanus*.

Lithobius celer Bollman.

Ent. Amer., 1888, **4**, p. 7. Bull. 46, U. S. N. M., 1893, p. 79. Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 43.
Lithobius celer Chamberlin, Ann. Ent. soc. Amer., 1909, **2**, p. 190 (*non* syn.)

Description.— Dorsum light to dark brown or somewhat chestnut, the posterior plates sometimes darker. Head more or less chestnut, often dusky behind the frontal suture. Antennae concolorous with head, paler distad. Prosternum more or less chestnut, the prehensors somewhat paler. Venter testaceous or light brown, the caudal ones darker and sometimes showing a paler median area. Legs testaceous to chestnut.

Body robust, the type specimens being only between six and seven times longer than the width of the tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 51:50:52:61:60.

Head widest a little back of eyes; only very slightly wider than long (51:50). Lateral breaks distinct. Caudal margin straight or nearly so.

Ocelli twenty to forty in from four to seven longitudinal series: *e.g.*, 1 + 4, 6, 6, 4, 3; 1 + 5, 6, 6, 6, 5, 2. Single ocellus of moderate size, elliptic or oval. Ocelli of top series larger than the others as usual, the most caudal one often being as much as three fourths as large as the single one.

Antennae moderate or short; composed of thirty to thirty-four articles. Hairs rather long, dense.

Prosternum between 1.6 and 1.7 times wider than long. Distance between chitinous spots 1.8 times greater than width at level of bottom of median sinus; 2.6 times length of dental line. Teeth 5 + 5 to 7 + 7; rounded apically; the more mesal ones sometimes very small. Dental line on each side nearly straight, bending caudad a little toward middle. Spine inserted ectad of most ectal tooth; straight and acutely pointed; slender.

Dorsal plates smooth and shining. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced; posterior margin of the seventh plate straight or nearly so, or its corners in some very slightly extended.

Coxal pores all circular; moderate or small in size; number in adults from 3, 4, 4, 3 to 5, 6, 6, 5.

Gonopods of male distally subtruncate or but little convex; the sides diverging proximad.

Claw of female gonopods rather short, well curved; distally tri-

partite, the lateral lobes rather slender and acute, with the median one considerably larger.

Anal legs in the male short; the fourth article somewhat enlarged and ventrally longitudinally furrowed. The anal legs in the female very nearly the same.

Spines of first and second legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third to fifth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the sixth the same or $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the seventh to ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the tenth and eleventh, $\frac{1, 3, 2, 2}{0, 0, 3, 3, 2}$ or the tenth with dorsal coxal spine missing; of the twelfth and thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, three claws, the anterior accessory being very small; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$, claw one. Last three pairs of coxae laterally armed.

Length 15–25 mm.

Type Locality.— Arkansas: Little Rock!

Reported by Bollman as common throughout Arkansas where it seems to replace *L. forficatus*.

The description above given is based upon Bollman's typical material from Little Rock. The specimens are in very bad condition.

Lithobius chumasanus Chamberlin.

Proc. Acad. nat. sci. Phil., 1903, p. 154.

Description.— Dark chestnut to mahogany. The dorsal plates sometimes showing longitudinal paler lines. The head and first dorsal plate like remaining portion of dorsum but commonly more suffused with black in irregular patches. Antennae chestnut; lighter distally where it may be light ferruginous or orange. Venter brown, often very dark, with the caudal plates more reddish in cast. Prosternum and prehensors dark chestnut. Legs nearly like corresponding plates of venter, but with tarsi of all more or less of orange tinge which may also affect the other segments of the anal and penult legs.

Body robust, being only 6.5–7 times as long as width of the tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 77 : 75 : 77 : 86 : 88 : 76.

Head much wider than long (77 : 69). Marginal breaks weak or obscure. Sides a little converging caudad from a little behind eyes, only weakly convex. Caudal margin straight or weakly excurved. Uneven; subdensely punctate.

Ocelli fourteen to twenty-one in four or five longitudinal series: *e.g.*, 1 + 4, 4, 3, 2; 1 + 5, 5, 5, 4; 1 + 4, 5, 5, 5, 3. Single ocellus large, subvertically broadly elliptic. Seriate ocelli rather large, distinct and regular, all deeply pigmented.

Antennae short, reaching in most to the seventh body segment. Composed of forty-two to forty-six articles which distad of the first few are mostly very short. Hairs dense excepting on the few first articles.

Prosternum 1.6 times wider than long. Distance between chitinous spots 1.75 times width at level of bottom of median sinus; 2–2.25 times as great as the dental line. Teeth in types 6 + 6 or 7 + 7; large and nearly uniform, distally rounded.

Dorsal plates shining, weakly roughened, the caudal ones more strongly so as usual. The short submarginal transverse sulci evident on plates caudad of the seventh. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced, those of no other at all extended.

Ventral plates all densely punctate, the most caudal ones and the genital segments more densely clothed with longer hairs than those found on the other ventral and on the dorsal plates. The usual three longitudinal impressions clearly indicated, the median one mostly reduced to a short subcircular depression immediately caudad of the middle of plate.

Coxal pores strongly transverse (elliptic in young specimens); in types from 7, 8, 8, 6 to 8, 8, 8, 7.

Gonopods of male short, but little exposed; bearing few long bristles.

Claw of female gonopods long and stout; with two short and nearly equal lobes and in some, at least, with a third small, almost obliterated lobe on mesal side. Basal spines stout, acutely pointed.

Anal legs in both sexes short and only little thickened; the third, fourth, and fifth articles longitudinally furrowed dorsally, these furrows a little better developed in the male. Penult legs more slender, the corresponding articles also dorsally furrowed.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,2,3,2}$ to $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the second to seventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eighth to tenth, the same or $\frac{0,0,3,2,2}{0,0,3,3,2}$ (in the tenth often one formula applying to the right leg, the other to the left); of the eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$, claws two. Last three pairs of coxae laterally armed.

Length of types 21–23 mm. A ♂ 21 mm. long has tenth plate 3.2+ mm. wide; antennae and anal legs 9 mm. long.

Locality.— California: Santa Barbara! (1902).

Only the types are known. This is a large and strongly marked species presenting many points of similarity to *L. forficatus*. From this species it is easily distinguished by the presence of lateral spines

on the posterior coxae, and especially the two claws of the anal legs as well as in various other features.

Lithobius atkinsoni Bollman.

Plate 1, fig. 6.

Lithobius atkinsoni Bollman, Proc. U. S. N. M., 1887, **10**, p. 625; 1888, **11**, p. 349. Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 42.

Description.— Dorsum light yellowish brown to chestnut, sometimes of subferruginous cast. Caudal portion of head a little darker than dorsum of body but in front of suture always distinctly lighter, often clear yellow or orange. First two articles of antennae nearly always yellow or light ferruginous; the remaining portion brown to yellow. Prosternum brown to light chestnut; the prehensors lighter, especially along ectal edge and distally, of reddish tinge. Venter from yellow to light orange, the caudal plates darker, more strongly reddish. Legs of color similar to that of corresponding plates of venter; anal and penult pairs very commonly much lighter on mesal surfaces and especially distally where often bright yellow, but otherwise the posterior legs are usually darker than the anterior ones.

Robust, wide in region of eighth and tenth plates; narrowed cephalad to second plate, more strongly narrowed caudad. Widths of first, third, eighth, and tenth plates to each other as 50 : 47 : 52 : 53.

Head a little wider than long (47 : 45). Lateral marginal breaks distinct as usual. Caudal portion of head subquadrate, the sides a little converging from eyes caudad to caudal corners. Caudal margin straight. The usual transverse curved mark just in front of caudal marginal thickening, its ends diverging cephalad. Smooth and shining; not punctate.

Ocelli thirteen to twenty-three (apparently mostly from fourteen to eighteen) in four or three series (three series mostly in *pseudomaturus* stage): *e.g.*, 1 + 3, 4, 6, 4; 1 + 5, 4, 4, 1; 1 + 5, 6, 5, 1; 1 + 5, 5, 5, 3; 1 + 3, 4, 4, 3; 1 + 6, 6, 5, 3. Ocelli thus very variable in size and arrangement, but mostly small and irregular, the series often confused. Single ocellus small, commonly not larger than largest of seriate ocelli.

Antennae short, reaching from fifth to seventh body segments; conspicuously attenuated distal, the distal portion being more slender than is usual. Articles twenty-one to thirty-three but mostly, twenty-six to thirty; articles immediately distad of the first several are short

and closely united, but distad in slender portion of antennae the articles become more loosely joined and proportionately somewhat longer. Hairs moderately long.

Prosternum 1.75 times wider than long. Teeth small, distinct, the more mesal ones closer together than the ectal ones: 4 + 4 to 7 + 7 in number. Median sinus moderate, rounded at bottom. Spine smaller than neighboring bristles, slender, pale, in usual ectal position.

Major tergites, excepting the first, with two longitudinal furrows, or also an additional one on each side close to border. Plates otherwise not at all roughened, smooth and shining. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced.

Coxal pores of moderate size; circular or, occasionally, a little transversely elongate or broadly subelliptic: 3, 4, 4, 3; 4, 5, 5, 4; 4, 6, 6, 4; 6, 7, 7, 5.

Gonopods of male appearing as low rounded eminences commonly covered by the preceding sternite.

Claw of female gonopods but little curved; broad; the three lobes subacute with the median one much the largest; commonly dark distad. Basal spines small, thin; sides from base to short acuminate tip subparallel; edges minutely serrate; dark, often blackish, distad (Plate 1, fig. 6).

Anal and penult legs short; moderately inflated in both sexes, especially distad of the prefemur and excepting the second tarsal article. Distinctly longitudinally sulcate along mesal surface of articles of tarsi and usually also tibia similarly sulcate, the tibiae and tarsi of penult legs similarly sulcate but sulcus on tibia usually more distinct than in anal legs. Glands on articles of last two pairs of legs strongly developed with the pores distinct.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,1,2,2}$ or ventral spines also 0, 0, 1, 2, 1; 0, 0, 2, 2, 1 or 0, 0, 2, 2, 2; of the second, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the third to eighth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$ or a dorsal spine sometimes present on coxa of eleventh pair while in one specimen four ventral spines were noted on the fourth article of one of ninth legs; of the twelfth, $\frac{1,0,3,1,1}{0,0,3,3,2}$; of the thirteenth and penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, the thirteenth with three claws and the penult with but one; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,2}$, claw one.[1]

Length 11.5 to 15 mm. A ♀ 14 mm. long has tenth plate 2 mm. wide; antennae 6.5 mm. long; and anal legs 5.7 mm. long.

[1] Bollman reports specimens from Macon, Ga., as having anal and penult legs armed with 0, 0, 1, 3, 3, 1 ventral spines; but none of many adults which I have examined from Georgia and elsewhere shows this spining, though it is present in immature stages.

Pseudomaturus.— Coloration as noted for adult or a little paler throughout.

Antennae as in *maturus* with articles a little more commonly toward the lower limit.

Ocelli frequently in but three series: *e.g.*, 1 + 3, 4, 6; 1 + 5, 4, 4; 1 + 5, 4, 3; 1 + 5, 6, 4; but also in four as in most mature specimens, as 1 + 6, 6, 4, 2; 1 + 6, 5, 5, 4.

Prosternal teeth mostly 5 + 5.

Coxal pores smaller, circular, the most proximal one often very small: 3, 4, 4, 3; 4, 5, 5, 4; 4, 6, 5, 5; etc.

Claw of female gonopods a little smaller and thinner and especially paler distally than in adult. Spines in form as in *maturus;* pale throughout.

Spines of legs as in *maturus* excepting that the ventral ones of the twelfth legs are frequently 0, 0, 2, 3, 2 instead of 0, 0, 3, 3, 2.

A specimen 10 mm. long has antennae 4.5 mm. long and anal leg 4 mm. long.

Praematurus.— Pale testaceous; head and most caudal segments very light ferruginous or orange with frontal region of head lightest as usual in older stages. Caudal pairs of legs light, yellow or sometimes yellowish white distad. Other legs and the venter pale with most caudal plates and the prosternum of orange tinge.

Articles of antennae twenty-four to twenty-eight.

Ocelli nine to twelve in three or more rarely in but two series: *e.g.*, 1 + 4, 3, 3; 1 + 4, 3, 2.

Prosternal teeth 5 + 5; the most mesal on each side often much reduced.

Coxal pores small, circular; mostly 3, 4, 4, 3.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,2,2,1}$ to $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,1,2,1}{0,0,2,2,1}$ to $\frac{0,0,2,2,1}{0,0,2,2,1}$; of the third $\frac{0,0,2,2,1}{0,0,2,2,1}$ to $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the fourth to sixth $\frac{0,0,2,2,2}{0,0,2,2,1}$ (or vent. 0, 0, 1, 2, 1); of the seventh, the same as preceding or $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the eighth, $\frac{0,0,2,2,2}{0,0,1(2),2,1}$ to $\frac{0,0,2,2,2}{0,0,2,3,2}$; of the ninth, $\frac{0,0,2,2,2}{0,0,2(1),2,1}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth, $\frac{0,0,2,2,2}{0,0,2(1),2,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the eleventh, $\frac{0,0,2,1(2),2(1)}{0,0,1,2,2}$ to $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{1,0,3,1,1}{0,0,2,3,2}$ or coxal spine missing; of the thirteenth, $\frac{1,0,2,1,1}{0,1,2,3,2}$ to formula for adult; of the penult and anal as in adult.

Length 8.5–10 mm. A specimen 8.75 mm. long has antennae 4 mm. and anal legs 3.5 mm. long.

Immaturus.— Pale yellowish or testaceous; in some a whitish median longitudinal dorsal line; caudal plates light ferruginous or orange. Head light ferruginous or pale orange, lighter in front of suture. Antennae like head proximally, pale yellowish elsewhere.

Venter a little paler than dorsum, the caudal segments and the prosternum light ferruginous. Last pair of legs lighter distad, especially on mesal surface.

Articles of antennae twenty-one to twenty-six.

Ocelli six to fourteen in two or less commonly in three or even in four series: *e.g.*, 1 + 4, 4, a common formula; 1 + 3, 2; 1 + 4, 4, 1; 1 + 2, 5, 6 (or 1 + 2, 5, 5, 1).

Prosternal teeth 5 + 5; small, well spaced, the most mesal one on each side commonly reduced.

Coxal pores 3, 4, 4, 3; small, the most proximal one on each coxa often minute.

Gonopods of female with the three articles distinct. Distal article glabrous; the second with two or three bristles; and the first with four of five. Claw short, pale, distally narrow and acute; entire, there being as yet no trace of the lateral teeth. Basal spines 1 + 1 or on one side there may be a second one indicated as a mere point; small, pale, acute.

Mesal longitudinal sulcus not showing on anal legs; but showing on both tarsal joints of the penult legs and more weakly on the tibia.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$ or $\frac{0,0,0(1),1,1}{0,0,1,2,1}$; of the second, $\frac{0,0,1,2(1),1}{0,0,2,2,1}$; of the third and fourth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the fifth to ninth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the tenth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ to $\frac{0,0,2,2,2}{0,0,1(2),2,2}$; of the eleventh, $\frac{0,0,2,2(1),2(1)}{0,0,1,2,2}$; of the twelfth, $\frac{0,0,3(2),1,1}{0,0,2,2,1}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,2,3,2}$; of the penult as in the adult; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$.

Length 8 to 9 mm. A specimen 8.5 mm. long has antennae 4 mm. long.

Agenitalis II.— Color similar to that of the *immaturus* but paler. Head and most caudal segments yellow or very dilute orange. Body of violaceous tinge in life.

Articles of antennae twenty-two to twenty-six.

Ocelli five or six in two series: *e.g.*, 1 + 3, 1; 1 + 3, 1. Single ocellus paler and smaller than the others or about equalling the one of bottom series.

Prosternal teeth 4 + 4 or 5 + 5; small, distinct, the most mesal on each side smallest. Spine of usual form and in some position as in older stages.

Coxal pores small: 2, 3, 3, 2 or 3, 3, 3, 2.

Anal and penult legs already inflated relatively about as in adult; sulcus evident on mesal surface of second tarsal article of penult legs, but on no others.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the second to the seventh, $\frac{0,0,1,2,1}{0,0,1,2,1}$;

of the eighth, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the ninth and tenth, $\frac{0,0,2,2,2}{0,0,1,2,2}$; of the eleventh, $\frac{0,0,2,1,2}{0,0,1,2,2}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,2,2,2}$; of the thirteenth, $\frac{1,0,2,1,1}{0,1,2,2,2}$; of the penult, $\frac{1,0,2,1,1}{0,1,3,3,1}$; of the anal, $\frac{1,0,2,1,0}{0,1,3,2,1}$.

Length of specimen described 7 mm.; antennae 3.5 mm.

Type Locality.— North Carolina: Jackson Co., Balsam!

Known Localities.— Georgia: Macon (L. M. Underwood), Atlanta! Lula! Tallulah Falls! Bremen! North Carolina: Balsam (G. F. Atkinson); Saluda! Hot Springs! South Carolina: Taylors! Greenville! Seneca!

Neolithobius Stuxberg (emend.).

Öfvers. Kong. vet.-akad. Förh., 1875, **32,** no. 3, p. 8, 10, 26. Proc. Cal. acad. sci., 1877, **7**, p. 135. Latzel (in part), Myr. Österreich-Ungar. monarch., 1880, **1**, p. 35. Bollman (in part), Proc. U. S. N. M., 1887, **10**, p. 262, 626. Bull. 46, U. S. N. M., 1893, p. 29, 43, 129, 164.

Eulithobius Verhoeff (in part), Myr. Bronn's Thierreich., 1907, **5**, p. 240.

Antennae moderate or long; articles thirty to fifty.

Ocelli numerous, seriate. Single ocellus clearly differentiated.

Prosternal teeth 5 + 5 to 10 + 10. Spine ectal in position, slender and mostly bristle-like distally. No diastema in dental line on each side.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced.

Coxal pores uniseriate, mostly transverse, but sometimes circular.

Claw of female gonopods tripartite. Basal spines 2 + 2 or, rarely, 3 + 3.

Gonopods of male uniarticulate or mostly so.

None of the coxae of legs armed ventrally. In all known species some of the posterior coxae are armed both dorsally and laterally.

Third joint of all legs armed with three dorsal spines. Fifth joint of legs from first or second to eleventh or sometimes to thirteenth armed with two dorsal spines. Dorsal spines of anal legs mostly 1, 0, 3, 1, 0, more rarely 1, 0, 3, 2, 0 or even 1, 0, 3, 2, 2 (sometimes in *mordax*); ventral 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claw one or two. Dorsal spines of penult legs 1, 0, 3, 1, 1 to 1, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2 or 0, 1, 3, 3, 3; claws one, two, or three. Dorsal spines of twelfth and thirteenth legs 1, 0, 3, 2, 2 or, less often, 1, 0, 3, 1, 1.

Anal legs of male with fourth joint enlarged, at least distally, being in most conspicuously widened, and especially bowed ventrad, or at least with dorsal surface depressed and incurved, rarely with dorsal surface not depressed but elevated at distal end.

Length 17–30 mm.

FIG. 5.—Distribution of Neolithobius Stuxberg.

GENOTYPE.— *Lithobius vorax* Meinert.[1]

Neolithobius includes a compact and homogeneous group of species having a seemingly unbroken distribution (Figure 5).

[1] Stuxberg specified no type. The three species originally included by that author are *vorax* Meinert, *mordax* L. Koch, and *transmarinus* (L. Koch). The first mentioned is here selected as the type.

Key to Species of Neolithobius.

a. Anal legs with the claw single.

b. Penult legs with but one claw.

c. Tibia of all or of nearly all legs excepting the anal with three ventral spines, dorsal spines of penult legs (usually also of twelfth and thirteenth) 1, 0, 3, 1, 1.

N. transmarinus (L. Koch).

cc. Tibia of none of legs normally with more than two ventral spines

d. Dorsal spines of penult legs 1, 0, 3, 2, 2 or 1, 0, 3(2), 2(3), 1

e. Ventral spines of anal legs 0, 1, 3, 3, 1, the dorsal normally, 1, 0, 2, 0; dorsal spines of penult legs 1, 0, 3, 2, 2 ..... *N. mordax* (L. Koch).

ee. Ventral spines of anal legs 0, 1, 3, 3, 2, the dorsal normally 1, 0, 3, 1, 0; dorsal spines of penult legs 1, 0, 3, 2(3), 1 ..... *N. helius* Chamberlin.

dd. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral spines of anal and penult legs 0, 1, 3, 3, 2.

e. Fourth joint of anal leg of male strongly produced dorsad at distal end (Plate 3, fig. 5).

N. xenopus Bollman.

ee. Fourth joint of anal leg of male moderately bowed ventrad but not conspicuously produced at distal end above ..... *N. suprenans,* sp. nov.

bb. Penult legs with two or three claws.

c. Dorsal spines of penult legs normally 1, 0, 3, 2, 2.

d. All legs from the thirteenth forward at least as far as the sixth pair with three ventral spines at distal end of the tibia ..... *N. latzelii* (Meinert).

dd. Either none of the legs with tibia bearing three ventral spines or at most the tibiae of thirteenth and of one or two preceding pairs thus armed .. *N. tyrannus* Bollman.

cc. Dorsal spines of penult legs normally 1, 0, 3, 1, 1 or at most 1, 0, 3, 2, 1.

d. Tibiae of all legs from second or first to thirteenth armed with three ventral spines ..... *N. vorax* (Meinert).

dd. Tibiae of all legs from first to thirteenth with but two ventral spines, none with three.

e. Dorsal hairs of anal segment of ♂ strongly curled or uncinate ..... *N. devorans* (Chamberlin).

cc. Dorsal hairs of anal segment of ♂ straight, not at all curled or uncinate..... *N. voracior* (Chamberlin).

aa. Anal leg with two claws.

Dorsal spines of penult legs 1, 0, 3, 1, 1; tibiae of twelfth and thirteenth and sometimes of one or two preceding pairs of legs with three ventral spines..... *N. underwoodi* (Bollman).

Neolithobius mordax (L. Koch).

Plate **3**, fig. 1, 2

Lithobius mordax L. Koch, Myr.-gatt. Lithobius, 1862, p. 34. Wood, Trans. Amer. phil. soc., 1865, **13**, p. 149. Meinert, Nat. tidsskr., 1872, **8**, p. 294.

Lithobius (*Neolithobius*) *mordax* Stuxberg, Öfvers. Kongl. vet.-akad. Förh., 1875, **32**, no. 3, p. 10, 26. Proc. Cal. acad. sci., 1877, **7**, p. 135. Bollman (in part), Proc. U. S. N. M., 1887, **10**, p. 262, 627. Ent. Amer., 1888, **4**, p. 8. Bull. 46, U. S. N. M., 1893, p. 29, 44, 46, 146, 185. Kenyon, Can. ent., 1893, **25**, p. 162. Chamberlin, Can. ent., 1911, **43**, p. 101. Psyche, 1918, **25**, p. 24.

?Lithobius howei Bollman, Amer. nat., 1887, **21**, p. 81. Proc. U. S. N. M., 1887, **10**, p. 255, 259. Bull. 46, U. S. N. M., 1893, p. 19, 22, 26.

Lithobius spinipes Bollman (in part), Bull. 46, U. S. N. M., 1893, p. 146.

Lithobius mordax louisianae Brolemann, Ann. Ent. soc. France, 1896, **65**, p. 48 (♂).

Lithobius transmarinus perarmatus Brolemann, Ann. Ent. soc. France, 1896, **65**, p. 48 (♀).

Lithobius transmarinus Chamberlin (in part), Ann. ent. soc. Amer., 1911, **4**, p. 45.

Description.— Dorsum from light to dark brown and chestnut; nearly uniform, or, in the paler specimens, with the first plate and several moot caudal ones darker than rest of dorsum; plates frequently paler along lateral and caudal margins and in a median longitudinal line, with sometimes one on each side of it. Head a little darker, and more reddish than the dorsum. Antennae chestnut, paler, often yellow, distad. Prosternum and prehensors chestnut. Venter testaceous to dark brown; the posterior plates darker, reddish or chestnut. Legs testaceous or brown, the posterior pairs darker, mostly same shade of chestnut like corresponding plates of venter.

Body moderate, commonly 8 or 8.25 times longer than width of the tenth plate. Nearly parallel-sided, but little narrowed cephalad from the eighth plate to the third, which is narrower than the first. First plate wider than head. Widths of head and of first, third, eighth, and tenth plates to each other as 94 : 96 : 88 : 94 : 95.

Head wider than long in ratio near 11.75 : 10.75; widest immedi-

ately caudad of eyes. Caudal margin mesally a little, widely incurved. Marginal breaks abrupt and distinct. Sides caudad of breaks moderately converging caudad to the rounded corners, nearly straight; between breaks and eyes convex. Surface rather finely but distinctly and uniformly punctate; not rugose or roughened otherwise. The usual semicircular impression a little in front of caudal marginal thickening with one or two pit-like depressions on median line in front of suture and usually a similar impression a little each side of the median line just caudad of the suture.

Ocelli twenty-seven to fifty, mostly in from six to eight series: *e.g.*, 1 + 5, 8, 7, 6, 5, 3; 1 + 6, 6, 6, 5, 3, 2; 1 + 5, 7, 9, 8, 8, 6, 5; 1 + 4, 7, 9, 10, 9, 6, 5. Single ocellus very much larger than any other; subvertically narrowly oval with the narrow end ventrad; often paler than the other ocelli. Seriate ocelli compactly arranged, the series often confused; an ocellus (usually the most caudal one of the fourth row) immediately in contact with single ocellus always considerably larger than any other of the seriate ocelli but smaller than the single one. Organ of Tömösvary often in contact with most anterior ocellus of bottom row and in some line or ventrad of it.

Antennae long, reaching the eighth body segment. Articles mostly thirty-five to thirty-nine.[1] Articles mostly moderately short, decreasing distad. Hairs rather short, dense.

Prosternum 1.8 times wider than long. Distance between chitinous spots 2+ times width at level of bottom of median sinus and up to as much as three times the dental line. Median sinus rather deep, its sides subparallel and its bottom rounded. Line of apices of teeth mesally distinctly reëntrant, each side being slightly convex. Outer teeth on each side more widely separated from each other than the more mesal ones which are often closely crowded: 6 + 6, perhaps most common; 6 + 7; 7 + 7; 7 + 8; 8 + 8; 7 + 9. Spine in usual ectal position; slender and acute, stouter than the bristles.

First dorsal plate smooth and shining like the head. Other plates finely roughened with tubercular elevations, the plates becoming more and more strongly tuberculate toward caudal end of body. Posterior angles of seventh, ninth, eleventh, and thirteenth plates strongly produced. Dorsal hairs of anal segment sparse, straight.

Ventral plates each with a distinct transverse furrow which reaches on each side only part way to the lateral margin and which is a little caudad of the middle of the plate. The usual lateral and median longitudinal furrows distinct.

[1] Reported with as few as thirty-two (Meinert) and even thirty (Bollman); but probably the specimens were immature.

Coxal pores elliptic to strongly transverse, slit-like or keyhole-shaped much as in *L. forficatus*: 6, 6, 6, 5; 7, 8, 7, 7; 7, 8, 8, 7; 8, 8, 8, 8; 11, 11, 11, 9.

Gonopods of male wide; caudal margin more or less convex, bearing mostly five or six bristles.

Claw of female gonopods long, but little curved; tripartite with the median lobe long and acute, but the lateral teeth small, far proximad, and often almost obliterated. Basal spines 2 + 2; subequal, stout, a little widening from base to beginning of acuminate distal portion, the edges of which are commonly minutely serrulate.

In the female the anal and penult legs are moderately long and slender; the femur of each is distinctly longitudinally sulcate along dorsal surface; the prefemur and femur less distinctly so; ectal surface of all articles longitudinally sulcate but most distinctly so on prefemur, femur, and tibia; also mesal surface, especially of more distal articles longitudinally sulcate; tibia and first tarsal joint of anal legs slightly bowed ventrad. In the male the femur of anal legs is thickened with the dorsal surface flattened and depressed or more or less bowed ventrad, longitudinally sulcate, more thickened at distal end; tibia slender and unmodified. In the male the same sulcations are present on the anal legs as in the female but those of the mesal surface are deeper and more distinct. Tibia of anal legs always considerably longer than the femur.

Spines of first and second legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third to eighth pairs, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of eighth or with ventral spines of seventh and eighth or of eighth alone 0, 0, 3, 3, 2; of ninth, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$ or with ventral spines 0, 0, 3, 3, 2; of the tenth and twelfth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$ (also noted on one side of one specimen as $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 1}$, the leg possibly regenerated); of the anal, $\frac{1, 0, 3, 2, 0}{0, 1, 3, 3, 1}$, the dorsal spining occasionally varying to 1, 0, 3, 2, 2 and 1, 0, 3, 1, 0; claw one. Last three or four pairs of coxae laterally armed.

Length 20–30 mm. A ♀ 29 mm. long has antennae and anal legs each 14 mm. long; and tenth plate 3.5 mm. wide.

Pseudomaturus.— Dorsum testaceous to dark brown, marked with the usual longitudinal pale lines Head brown to dull chestnut, contrasting more with the dorsal plates than in adults; frontal region paler. Antennae brown or light chestnut proximally, elsewhere light chestnut. Prosternum dull brown. Venter paler than dorsum, darker caudad, the legs like corresponding plates.

Antennae as in *maturus.*

Ocelli noted as 1 + 6, 6, 5, 4, 1; 1 + 6, 6, 6, 5, 4; 1 + 3, 5, 6, 6, 4, 2;

1 + 3, 6, 6, 5, 5, 3, 1; etc. Then in five to seven series, the larger number less common.

Prosternal teeth 5 + 6 to 8 + 8; as in *maturus*.

Coxal pores less strongly transverse than is usual in *maturus*, being more often elliptic to subcircular.

Claw of female gonopods shorter and less deeply colored than in *maturus* with lateral teeth more distinct and the median one relatively shorter. Spines nearly as in *maturus* or somewhat narrower proximad of apical division.

Spines of legs as in *maturus*. One specimen was noted with spines of both penult legs, $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 1}$. In one the ventral spines of tenth legs were 0, 0, 2, 3, 2. As many as the last seven pairs of coxae may be dorsally armed. Posterior legs of male as in *maturus* but femur mostly less enlarged.

Length 16–19 mm.

Praematurus — Testaceous or brown; showing the usual pale lines. Head a little darker; frontal region paler. Antennae brown, yellow distad. Prosternum and prehensors brown, a little darker than venter. Venter testaceous to brown, posterior plates a deeper brown. Posterior legs dilute ferruginous, often dark brown proximally.

Articles of antennae thirty-two to thirty-four; mostly short, in distal portion longer single articles alternating with groups of shorter ones.

Ocelli thirteen to twenty-three in three to five series: *e.g.*, 1 + 5, 4, 3; 1 + 3, 4, 3, 2; 1 + 3, 6, 5, 5, 3. All distinct. Single ocellus largest but the first one of second series, which is contiguous with it, not much smaller.

Prosternal teeth 5 + 5 to 7 + 7. Sides of median sinus considerably converging caudad.

Coxal pores circular to elliptic: 5, 5, 5, 4; 5, 5, 5, 5.

Claw of female gonopods small, pale, narrowly acute with no indications of lateral teeth or one indicated as a small acute point. Spines 2 + 2; slender, conical, sides converging from base to apex; inner spine much shorter and more slender than the outer.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 2, 2}$ or ventral spines 0, 0, 2, 3, 2; of the second and third, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the fourth and fifth the same or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the sixth to eighth as in *maturus;* of the ninth and tenth as in *maturus* or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of eleventh, twelfth, and thirteenth as in *maturus;* of penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, sometimes with mere traces of accessory claws; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$. Last five to seven pairs of coxae dorsally armed, last three or four pairs laterally. (Jackson, Alabama).

Immaturus.— Dorsum light brown, nearly uniform, the light lines much as in older stages. Head darker, somewhat reddish brown, with frontal region paler. Antennae light brown proximally, the distal two thirds lighter. Prosternum dusky brown. Posterior legs light, yellowish distad.

Articles of antennae thirty-one; beyond the first few short and very short ones are intermingled.

Ocelli twelve to sixteen in three or four series: *e.g.*, 1 + 3, 5, 5; 1 + 4, 5, 4, 2.

Prosternal teeth 5 + 5.

Coxal pores 4, 4, 4, 3; circular or a little elliptic.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 1}$; of the second and third, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 2, 1}$; of the fourth to ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 1}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 1}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{0, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, claw unarmed or with mere traces of accessory claws; of the anal $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$. Last two pairs of coxae, at least, laterally armed.

Length of specimen described 10 mm.; antennae and anal legs 5 mm. long.

Type Locality.— Louisiana: near New Orleans.

Known Localities.— Louisiana: New Orleans! Mississippi: Biloxi! Holly Springs! Fernwood! Canton! Brookhaven! Alabama: Jackson! Selma! Mobile! Tennessee: Nashville! Arkansas: Little Rock to Ultima Thule (Bollman) Iowa! Kansas! Nebraska! Minnesota: Fort Snelling! Winona!

Lithobius howei Bollman was based upon a single male from Fort Snelling, Minn. The specimen in the U. S. N. Museum labeled type is a male of *N. mordax* Koch, differing so much from the original description that it is very doubtful whether some transfer of specimens may not have been made. It differs in size, being 20 mm. long instead of 15 mm.; in having the posterior angles of the seventh, ninth, eleventh, and thirteenth dorsal plates produced instead of only the ninth, eleventh, and thirteenth; and in having the prosternal teeth twelve (six on each side) instead of six all together (or three on each side). Bollman said that his type was in bad condition, a statement true of the specimen under consideration. The antennae are broken off; but the original description states that twenty articles are present which, of course, could not apply to a specimen of *mordax*. Later Bollman dropped the name *S. politus* (McNeil) and applied the name *L. howei* to the same specimen that had previously borne the former name; but there are some differences between the original description and *S. politus*, so that if the specimen above mentioned be rejected as

the type, it is difficult to apply the name *L. howei* with certainty. Bollman himself, however, in his later writings, without any explanation of the change, applied it to *Sonibius politus* (McNeil).

Neolithobius transmarinus (L. Koch).

Plate **3**, fig. 3, 4.

Lithobius transmarinus L. Koch, Myr. gatt. Lithobius, 1862, p. 33, 34.

Lithobius (*Neolithobius*) *transmarinus* Stuxberg, Öfvers. Kongl. vet.-akad. Förh., 1875, **32**, no. 3, p. 26, 32. Bollman (in part), Proc. U. S. N. M., 1887, **10**, p. 626. Ent. Amer., 1888, **4**, p. 8. Bull. 46, U. S. N. M., 1893, p. 43, 80. Chamberlin (in part), Ann. Ent. soc. Amer., 1911, **4**, p. 45. Psyche, 1918, **25**, p. 24. Gunthorp (in part), Kans. univ. Sci. bull., 1913, **17**, p. 166.

Lithobius spinipes Bollman (in part), Bull. 46, U. S. N. M., 1893, p. 146.

Description. — Dorsum from yellowish brown to deep brown; in darker specimens the major scuta often more deeply colored along caudal borders, blackish; a median pale line with one each side of it, as in *mordax*, more or less traceable; nearly uniform, the posterior plates commonly not darker. Head with a more reddish cast; frontal region paler. Antennae brown or dilute chestnut proximally, becoming pale distad. Prosternum light chestnut, the prehensors commonly more reddish. Venter yellow or light brown, sometimes almost slate colored, the last few plates a very little darker. Legs in general like corresponding parts of venter; the tarsi in specimens in full color more or less orange; posterior pairs from yellowish or very dilute orange in paler specimens to deep orange or somewhat ferruginous in the darker ones.

Body in an average male 8.5 times longer than width of tenth plate. First plate widest widths of head and of first, third, eighth, and tenth plates to each other as 78 : 82 : 76 : 79 : 79.

Head a little wider than long (*ad* 78 : 75). Distinctly and uniformly punctate, the puncta fine. Not rugose; shining. A fine and indistinct sulcus parallel with the frontal suture and a little caudad of it. Also a weak sulcus parallel with and a little in front of sulcus, its median portion angularly bent forward and continuous with a median line that bifurcates cephalad. The usual semicircular impression in front of median part of caudal marginal thickening, the free ends extending cephalad subparallel with each other.

Ocelli twenty-five to thirty-six in five to seven series: *e.g.*, 1 + 6, 6, 5, 4, 3; 1 + 5, 6, 5, 5, 4, 4, 2. Single ocellus very large, oval,

contiguous with seriate ones. Ocelli of top series larger than others, the most caudal one of this series or of the second one largest but proportionately smaller than the large one contiguous with the single ocellus in *mordax*.

Antennae reaching seventh segment. Articles thirty to forty; but mostly thirty-five to thirty-eight, thirty-six being a frequent number. Proximal articles long, others decreasing distad and becoming short and very short; in the distal portion a longer article may occur at intervals among the shorter ones.

Prosternum in one specimen only 1.54 times wider than long Distance between chitinous spots 2.3 times width at level of bottom of sinus; 2.65 times dental line. Teeth stout, black, distally rounded: 5 + 5; 6 + 6; 6 + 7; 7 + 7. Spine slender and bristle-like, scarcely shorter than the bristles.

First dorsal plate with a depression near beginning of caudal third of length on each side, this bending forward nearly parallel with margin; surface finely punctate like head, otherwise smooth. The next two or three major plates with a similar but deeper depression on each side, mesally bending forward and continuing as a furrow each side of middle. Major plates also with the usual short, transverse, sharply impressed submarginal sulcus and most also showing a short curved sulcus at anterior corner. Anterior plates only slightly uneven but the more caudal ones becoming more and more distinctly roughened, with the rugae or low and broad tubercles, but the roughening never very strong. Posterior major plates showing a median longitudinal furrow and one each side of it.

Ventral plates showing the usual lateral sulci and the curving suture at caudal ends. A transverse furrow a little in front of caudal margin.

Coxal pores strongly transverse to elliptic, the most mesal one on each coxa commonly much smaller and subcircular: 6, 7, 7, 5; 5, 8, 7, 5; 8, 9, 8, 7.

Gonopods of male well exposed; sides subparallel; distal edge but little convex; bristles three or four.

Claw of female gonopods long; tripartite; the median division much the longest, acute; lateral lobes small, dentiform, toward middle of claw. Basal spines 2 + 2, long, attenuated from base to acute tip.

Anal legs of male slender and moderately long; femur not enlarged though dorsally somewhat elevated at distal end, its dorsal surface not depressed or bowed ventrad (Plate 3, fig. 3); femur, tibia, and the tarsal articles distinctly longitudinally sulcate along dorsal surface, the prefemur with two longitudinal dorsal sulci; prefemur and femur

sulcate ventrally; the last four articles also very distinctly longitudinally sulcate along the mesal surface. Penult legs similarly furrowed but the dorsal furrow usually weak or absent upon tarsal articles. Posterior legs of the female similar throughout, or a little longer and femur not distally at all elevated.

Spines of first legs, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,3}$; of the second to the seventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,3}$; of the eighth the same or $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,3}$; of the ninth to eleventh, $\frac{1,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,3}$; of the twelfth and thirteenth, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,3}$, or dorsal spines less often 1, 0, 3, 2, 2, while spine of trochanter may be absent from twelfth legs or from one of them; of the penult, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,3}$, claw single; of the anal, $\frac{1,\,0,\,3,\,1,\,0}{0,\,1,\,3,\,3,\,2}$, claw single. Last three pairs of coxae laterally armed.

Length on average near 24 mm. A ♂ of this length has antennae 11.8 mm. long; anal leg 10.8 mm. long; and tenth plate 2.8 mm. wide.

Type Locality.— Louisiana: New Orleans.

Known Localities.— Louisiana: New Orleans! Mississippi: Canton! Brookhaven! Arkansas: Little Rock, etc. (*seq.* Bollman). Texas!

The material of this species studied is insufficient for a wholly satisfactory account, and more specimens would doubtless considerably extend the range of variation indicated for a number of the characters and measurements.

Neolithobius vorax (Meinert).

Plate **2**, fig. 4–6.

Lithobius vorax Meinert, Nat. tidsskr., 1872, **8**, p. 292.

Lithobius (*Neolithobius*) *vorax* Stuxberg, Öfvers. Kongl. vet.-akad. Förh., 1875, **32**, no. 3, p. 26, 32. Proc. Cal. acad. sci., 1877, **7**, p. 135. Bollman, Proc. U. S. N. M., 1887, **10**, p. 627. Ent. Amer., 1888, **4**, p. 8. Bull. 46, U. S. N. M., 1893, p. 44, 80. Chamberlin (in part), Ann. Ent. soc. Amer., 1911, **4**, p. 45.

Description.— Dorsum from brown to deep chestnut, the head and first dorsal plates the same or a little darker and more reddish. Antennae chestnut, slightly paler distad. Prosternum chestnut, the prehensors clearly more reddish. Venter from yellowish brown to dark brown, the posterior plates somewhat darker, more reddish, but these darker plates each with a median pale area, a similar one showing also on the other plates in darker individuals.

Body robust, being from 7 to 7.5 times longer than the width of the tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 64 : 65 : 64 : 76 : 78, the head being thus

narrower than the first plate and much narrower than the eighth and tenth.

Head only slightly wider than long. Subquadrate caudad of the eyes, the sides a little converging caudad of the breaks and the posterior corners well rounded. The usual narrow, semicircular impression on caudal part of plate and the small, pit-like median impression cephalad of frontal suture. Surface very finely and sparsely punctate.

Ocelli twenty-eight to fifty in six to ten series but mostly in seven to nine: *e.g.*, 1 + 5, 4, 5, 5, 4, 3, 3; 1 + 3, 5, 5, 5, 6, 4, 4, 2(1); 1 + 5, 4, 5, 5, 5, 4, 3; 1 + 6, 5, 5, 5, 3, 3; 1 + 5, 4, 5, 6, 6, 5, 4, 2; 1 + 5, 5, 6, 6, 5, 2. Single ocellus large, oval. Seriate ocelli closely crowded, black, those of top row clearly largest. The eye-patch is unusually high dorsoventrally and the number of series correspondingly large. Organ of Tömösvary small, well removed ventrocephalad of eye-patch.

Antennae rather long, reaching well upon the eighth body segment; attenuated and becoming very slender distad. Articles mostly from thirty-eight to forty-three in number, rarely as many as forty-eight. Articles beyond the second moderate, decreasing in size toward the distal end.

Prosternum 1.7 times wider than long. Distance between chitinous spots 1.9 times width at level of bottom of median sinus; 2.4 times the dental line. Teeth rather stout, black, acute, the innermost on each side usually much smallest, those toward the middle of the series on each side somewhat largest: 5 + 5; 6 + 6; 6 + 7; 7 + 7. Spine at ectal angle; slender but truly spine-like being much stouter than the adjacent bristles, acutely pointed.

Dorsal plates to the naked eye appearing mostly smooth and shining, especially the first one; under a lens the more caudal plates appear finely roughened or weakly tuberculate; clothed with short hairs which are more dense on caudal ones as usual. Hairs of dorsal surface of anal segment straight, few in number. Major plates with the usual short submarginal transverse sulci near caudal third, these indistinct on anterior plates. Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced.

Ventral plates showing the lateral longitudinal sulci as usual. The median sulcus most clearly impressed at anterior end of each plate and caudal of middle, this second portion often pit-like, the sulcus as a whole more extensive on the more caudal plates.

Coxal pores strongly transverse or in some narrowly oval: in number *e.g.*, 6, 7, 7, 6; 6, 7, 8, 6; 8, 9, 9, 7; 9, 10, 10, 8, etc.

Gonopods of male well exposed, sides only slightly converging distad; distal surface gently convex, bearing five or six bristles.

Claw of female gonopods rather wide; tripartite, the divisions all acute, the median longest but relatively considerably shorter and smaller than, *e.g.*, in *mordax*. Basal spines rather long, acuminate from base to tip (Plate 2, fig. 5, 6).

Anal legs of male short; the fourth article (or femur) conspicuously thickened, being abruptly broader than the tibia, proximal portion as a whole bowed ventrad, its dorsal surface deeply longitudinally sulcate; tibia also dorsally longitudinally sulcate and the prefemur less conspicuously so; ectal and mesal surfaces of articles longitudinally sulcate; prefemur, femur, and tibia also ventrally longitudinally sulcate, the tibia least distinctly so. Penult legs sulcate similar to the anal; but the femur not enlarged or but little so and not at all bowed ventrad, its dorsal sulcus relatively deep. In the female the femur of the anal legs is not thickened or bowed; the furrows are less strongly marked than in the male excepting those along the mesal surface.

Spines of first legs, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$ or $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 3}$; of the second, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 3}$ or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$; of the third to ninth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$; of the tenth and eleventh, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$ or coxal spine of tenth absent; of the twelfth and thirteenth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 3}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$, claws two or a minute anterior accessory detectable in addition; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 2}$, claw one. Last three or four pairs of coxae laterally armed.

Length 18–24 mm. A ♂ 21 mm. long has antennae 10.5 mm. long; anal legs 8.25 mm. long; and tenth plate 3 mm. wide.

Pseudomaturus.— Color like that of adult but paler throughout; dorsal plates showing the characteristic longitudinal pale lines. Posterior legs yellowish brown to chestnut, the distal articles mostly light orange, a color also affecting the tarsi of the other legs as well.

Articles of antennae thirty-two to thirty-six.

Ocelli 1 + 5, 6, 4, 4, 4; 1 + 5, 6, 6, 4, 2; 1 + 5, 6, 5, 4, 3, 1; 1 + 6, 6, 5, 5, 4, 3; 1 + 5, 6, 6, 5, 4, 3, etc. Most caudal ocellus, of top row commonly much larger than others excepting the single one.

Prosternal teeth much most commonly 5 + 5; also observed as 4 + 6 and 6 + 6; the most mesal and sometimes the most ectal tooth on each side often reduced.

Coxal pores varying from subcircular to transversely oblong in larger specimens: 6, 6, 6, 5, most commonly; also 7, 7, 7, 6 to 7, 8, 8, 6 and 8, 8, 8, 7.

Claw of female gonopods considerably shorter than in adult; the median lobe relatively shorter and smaller, often not greatly exceeding

the lateral. Spines as in *maturus* but lighter and often appearing less acuminate above base.

Gonopods of male bearing on average fewer bristles than in adult, there being but two in the smallest specimens but the number rising to five in the larger and nearly adult ones.

Anal legs of male as in *maturus* but femur less bowed as a rule.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second the same or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the third, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the fourth and fifth the same or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 3}$; of other legs as in *maturus*.[1]

Length 15–17 mm.

Praematurus.— Somewhat paler throughout than older specimens.

Articles of antennae, thirty-four, mostly very short.

Ocelli 1 + 5, 5, 4, 3, 1; 1 + 5, 4, 5, 3, 2, 1.

Prosternal teeth 5 + 5, uniform, paler than in adult.

Coxal pores small, circular: 6(5), 6, 6, 5.

Claw of female gonopods small, nearly straight, rather pale; distinctly tripartite, the lateral divisions or teeth small and acute, the median one also acute. Basal spines 2 + 2, the inner one shorter and much more slender than the outer one.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the second, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third and fourth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the fifth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 3}$; of the sixth the same or $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 3}$; of the seventh to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 3}$; of the twelfth to fourteenth as in the *maturus;* of the anal as in *maturus* (or with ventral spines on one side 0, 1, 3, 3, 1). Last three coxae laterally armed.

Length 13.5 mm.; antennae 6 mm.; anal leg 5 mm. (Fernwood, Miss.).

Agenitalis II.— Dorsum from pale whitish yellow to pale brown, the posterior plates darkest. Body in life suffused with violaceous. Head a little darker than dorsum, frontal region palest. Antennae yellowish or pale brown, in latter case lighter distad. Legs whitish, the caudal pairs more yellow.

Articles of antennae twenty-five; those beyond the first few short, moniliform; sometimes longer articles occurring at intervals among shorter ones.

Ocelli six or seven to twelve in two or three series: *e.g.*, 1 + 2, 3; 1 + 2, 3, 1; 1 + 4, 4, 3. The first ocellus of second series, as large as or larger than the single one. Ocelli distinct, separated.

Prosternal teeth mostly 4 + 4; also noted as 4 + 5; small, the ectal ones more widely separated than the mesal.

[1] In twelfth legs the trochanter of the *right* one lacks a spine, the ventral formula being 0, 0, 3, 3, 3.

Coxal pores small, circular: 2, 2, 2, 2 or 3, 2, 2, 2.

Gonopods of female appearing as slender cylindric processes which are glabrous and undivided or with first subdivision but weakly indicated.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the second the same or $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the third the same or $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the fourth and fifth, $\frac{0,0,1,2,1}{0,0,1,1,1}$ or $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the sixth, $\frac{0,0,1,2,1}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the seventh to tenth, $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the eleventh, $\frac{0,0,2,1,1}{0,0,1,2,1}$ or dorsal spines 0, 0, 2, 1, 0; of the twelfth, $\frac{0,0,2,1,0}{0,0,1,2,1}$, $\frac{0,0,2,1,0}{0,0,2,2,1}$ to $\frac{0,0,2,1,1}{0,1,1,2,1}$; of the thirteenth, $\frac{0,0,2,1,0}{0,0,1,1,1}$ to $\frac{0,0,2,1,0}{0,1,1,1,1}$; of the penult, $\frac{0,0,2,1,0}{0,1,2,1,0}$ $\frac{0,0,2,1,0}{0,1,3,3,0}$ or $\frac{0,0,2,1,0}{0,1,3,2,1}$; of the anal, $\frac{0,0,2,0,0}{0,1,3,2,0}$ and $\frac{0,0,2,1,0}{0,1,3,2,0}$ to $\frac{1,0,3,1,0}{0,1,3,2,0}$. No lateral coxal spines detected on any legs and a dorsal spine on only anal coxae of some specimens.

Length 7–7.5 mm. A specimen 7 mm. long has antennae 3 mm. long, the anal leg being about the same. (Jackson, Ala.)

Type Locality — Mississippi: Biloxi.

Known Localities — Mississippi: Biloxi! Ocean Springs! Fernwood! Longbeach! Grenada! Jackson! Byram! Brookhaven! Alabama: Jackson! Florida: Pensacola! (Types of *clarus* McNeill, which is *pseudomaturus* of present species). Tennessee: Nashville!

Neolithobius latzelii (Meinert).

Lithobius latzelii Meinert, Proc. Amer. philos. soc. 1886, **21**, p. 175. Bollman, Proc. U. S. N. M., 1887, **10**, p. 626; 1888, **11**, p. 350.
Lithobius vorax Chamberlin (in part), Ann. Ent. soc. Amer., 1911, **4**, p. 45.

Description.— Dorsum dark brown, the posterior plates a little deeper in color; the dorsal plates, especially the more caudal ones, may show a median longitudinal black line with a less deep one each side of and parallel with it. Head dark chestnut. Antennae more brownish than the head, somewhat paler distad. Prosternum dark brown, the prehensors more reddish. Venter light brown or testaceous, the posterior plates darker but usually not reddish. Legs colored like the corresponding plates of venter, the posterior pairs being thus darker.

Body rather robust, being near 7.5 times longer than width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 98 : 95 : 80 : 84 : 84 : 80 (♂); 69 : 65 : 63 : 73 : 73 : 68 (♀).

Head unusually broad, being in ♂ commonly clearly broader than any dorsal plate, but not in ♀, and its width 1.25 (♂) or 1.2 (♀)

times greater than its length. Caudal margin rather strongly incurved mesally. Anterior margin incurved between bases of antennae. The usual short, transverse, semicircular impression a little in front of caudal margin and the short median sulcus in front of the suture. Head polished; very sparsely finely punctate.

Ocelli thirty-five to forty-eight in seven to nine longitudinal series: *e.g.*, 1 + 5, 5, 6, 6, 5, 5, 3; 1 + 6, 6, 6, 6, 5, 5, 3. Single ocellus large, ovate. Ocelli of top row larger and paler than others.

Antennae mostly moderate in length, reaching upon seventh segment or more rarely to near end of eighth; less strongly attenuated distad than in *vorax*. Articles thirty-one to thirty-four; the proximal ones long, the others decreasing in size to the ultimate, mostly short, longer ones sometimes occurring at intervals. Hairs rather short, dense.

Prosternum twice as wide as long or nearly so (♂) to 1.8 times wider (♀). Distance between chitinous spots 1.9 times as wide as width at level of bottom of sinus; 2.33 times dental line. Teeth, from 6 + 6 to 10 + 10, often differing in number on the two sides; narrowly rounded distally; irregular in size and spacing.

Dorsal plates weakly roughened, especially the more caudal ones, the rugae rather coarse but not high. The usual short, transverse submarginal sulci near caudal third of length on major plates. Posterior angles of seventh, ninth, eleventh, and thirteenth plates produced. Dorsal hairs of anal segment few, straight.

Ventral plates subdensely though rather irregularly finely punctate. Lateral sulci distinct as usual. Median sulcus also evident, this commonly deepest near middle.

Coxal pores large, transversely elliptic with proximal ones circular or else all circular: 4, 7, 7, 5; 5, 5, 6, 5; 5, 6, 7, 5; 6, 6, 6, 5; 5, 7, 6, 4; 5, 6, 7, 5; and 5, 6, 6, 5 which seems to be the most frequent arrangement.

Claw of female gonopods short and broad; tripartite, the lateral divisions rather large, the median longer and mostly more acute. Basal spines 2 + 2 or rarely 3 + 3, decreasing in size from most ectal to most mesal on each side; stout, acuminate from base to tip.

Anal legs of the male short; fourth article a little enlarged, dorsal surface conspicuously incurved and longitudinally sulcate; fifth joint or tibia somewhat bowed ventrad, dorsally longitudinally sulcate; the dorsal sulcus of femur and first tarsal article more indistinct; third and fourth articles ventrally longitudinally sulcate and all articles sulcate along mesal surface. Penult legs similarly sulcate

but the fourth article not enlarged or having dorsal surface incurved nor in the tibia at all bowed ventrad.

Spines of first legs, $\frac{0,\ 0,\ 3,\ 2(1),\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the second, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$ or dorsal 0, 0, 3, 2, 2; of the third to fifth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$ or ventral of fifth sometimes 0, 0, 2, 3, 3; of the sixth to ninth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 3}$ or ventral of sixth to eighth rarely 0, 0, 2, 3, 2; of the tenth and eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$; of the twelfth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$ or ventral 0, 1, 3, 3, 3; of the thirteenth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 3}$; of the penult, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$, two accessory claws present; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 2}$, or rarely with the dorsal spines 1, 0, 3, 2, 0 or 1, 0, 3, 2, 1; claw single Last three pairs of coxae laterally armed.

Length 19–25 mm. A ♂ 24.5 mm. long has anal legs 9.5 mm. long; antennae 13 mm. long; and tenth plate 3.2 mm. wide (head 3.75 mm. wide). A ♀ 20 mm. long has tenth plate 2.67 mm. wide.

Pseudomaturus.— Similar in color to *maturus* but on average paler throughout, the dorsum being light brown or testaceous and the head chestnut. Venter yellowish brown, the caudal ones darker. Legs corresponding in color to adjacent plates of venter.

Antennae as in *maturus;* articles thirty-one or thirty-two.

Ocelli fifteen to thirty-two in five to seven series: *e.g.*, 1 + 3, 4, 5, 3, 2, 1; 1 + 3, 4, 4, 2, 1; 1 + 3, 5, 6, 4, 4, 3, 2; 1 + 2, 3, 5, 6, 6, 4, 4.

Prosternal teeth 5 + 5 or 6 + 6. Spine short and fine as in *maturus.*

Coxal pores circular, of moderate size to small: 5, 5, 5, 4; 5, 5, 5, 5.

Gonopods of female as in adult but claw somewhat smaller and paler and the lateral lobes more acute. Bristles somewhat fewer.

Spines of legs as in adult.

Length 16–19 mm. A ♀ 19 mm. long has antennae 10 mm. long; anal legs 7 mm. long; and tenth plate 2.5 mm. wide. Widths of head and of the series of plates 1, 3, 8, 10 and 12 to each other as 62 : 60 : 56 : 65 : 67 : 60.

Type Locality.— Virginia: Crandall.

Known Localities.— Virginia: Crandall! Luray and Marksville (L. M. Underwood). North Carolina: Brown's Summit! Chapel Hill!

Neolithobius tyrannus Bollman.

Lithobius (*Neolithobius*) *tyrannicus*[1] Bollman, Proc. U. S. N. M., 1887, **10**, p. 626.

Lithobius (*Neolithobius*) *tyrannus* Bollman, Bull. 46, U. S. N. M., 1893, p. 43.

Lithobius mordax Bollman (in part), Proc. U. S. N. M., 1887, **10**, p. 262. Chamberlin (in part), Ann. Ent. soc. Amer., 1911, **4**, p. 45.

[1] A misprint for *tyrannus.*

DESCRIPTION.— Dorsum dark brown, sometimes approaching chestnut. Head similar or a little more reddish or chestnut, the frontal region paler. Antennae pale chestnut, lighter distad. Prosternum dark brown, prehensors more reddish. Venter brown, the posterior plates somewhat darker; most plates with a pale median area. Legs fulvous.

Body robust, typically only about 6.5 times longer than width of the tenth plate. Tenth plate widest; first and third plates equal or nearly so (♀). Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 84 : 87 : 87 : 90 : 92 : 87 (♀).

Head wider than long in ratio 12 : 11. Widest immediately caudad of eyes, from where the sides manifestly converge to the rounded caudal corners. Caudal margin straight. Lateral marginal breaks distinct. Surface punctate, the puncta moderate, deeply impressed. The caudal semicircular impression in caudal region distinct. A rather obscure furrow parallel with and a little caudad of the frontal suture and a shorter furrow parallel with the median portion just in front of the suture, then angularly bent forward at middle and there continuous with the median sulcus.

Ocelli thirty to forty-seven in six to nine, but mostly in seven or eight series: *e.g.*, 1 + 5, 5, 6, 6, 4, 4; 1 + 4, 5, 5, 7, 6, 5, 4, 3. The eye-area thus relatively high dorsoventrally as in *vorax*. Single ocellus large, vertically oval. The ocelli of top series decidedly largest, especially the more caudal ones, than those of the other series and usually paler.

Antennae moderate, reaching upon the seventh body segment; attenuated distad but the terminal portion relatively less slender than *e.g.*, in *vorax* but nearly same as in *latzelii*. Articles from thirty-one to thirty-six but apparently most often thirty-two as in *latzelii;* moderate to short.

Prosternum 1.6 times wider than long. Distance between chitinous spots two times width at level of bottom of sinus; 2.5 times the dental line. Dental line convex on each side. Teeth rather larger, subuniform, subacute: 6 + 6 to 8 + 8. Spine very slender and bristle-like, inserted immediately ectad of most ectal tooth.

Dorsal plates punctate. All roughened but the posterior ones more strongly so. Excepting the first, all major plates show clearly the transverse submarginal sulcus on each side.

Ventral plates rather subdensely punctate the puncta deeply impressed; same finely roughened. The usual longitudinal sulci plainly indicated. Commonly more or less depressed or furrowed transversely near or caudad of middle of plate.

Coxal pores transverse, narrowly elliptic or slit-like: 6, 7, 7, 5; 7, 8, 8, 7; 8, 8, 8, 6; 8, 9, 8, 7; 10, 10, 8, 7; 10, 10, 7, 6.

Claw of female gonopods long and stout, moderately curved; tripartite, but the median lobe much longest, acute, and the lateral ones very small and sometimes almost obliterated, giving the claw the appearance of entirety; the inner tooth usually smaller than outer. Basal spines long and stout; equal or nearly so; acuminate uniformly from base or somewhat more strongly acuminate over distal third.

Posterior legs of female short and rather stout Anal legs with tarsal joints longitudinally sulcate along mesal surface, the other only obscurely so; third, fourth, and fifth joints sulcate ventrally; the fourth and, less distinctly, the fifth joints dorsally longitudinally sulcate. Penult legs similarly sulcate. In the male the posterior legs are as in the female excepting that the fourth joint of the anal legs is conspicuously enlarged and its dorsal surface, or to some extent the whole article, is bowed ventrad and longitudinally more deeply sulcate as in *latzelii*.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second to tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$ or ventral spines 0, 0, 3, 3, 3; of the twelfth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 3}$ or the ventral spines 0, 0, 3, 3, 2; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 3}$ or the ventral spines may be 0, 1, 3, 3, 2; of the penult, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$. Last 3 pairs of coxae laterally armed.

Length 18–26 mm. A ♀ 22.5 mm. long has antennae 12.5–13 mm. long; anal leg 10 mm. long; and tenth plate 3.5 mm. wide.

Type Locality.— Indiana: Bloomington!

Known Localities.— Indiana: Bloomington! Greencastle; Salem! Lafayette; New Providence (Bollman collection).

This species is very close to *latzelii* Meinert. It differs in the spining of legs as well as in the proportions of head, prosternum, and body as a whole and in the form of the claw of the female gonopods. Description based on the type material.

Neolithobius devorans Chamberlin.

Lithobius devorans Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 147.

Description.— Dorsum from brown to chestnut and, in largest specimens in full color, almost mahogany. In lighter specimens the head is chestnut and clearly darker than the dorsal plates excepting the first one in some, in which the latter plate may approach the same color; in the more deeply colored specimen the head is deep chestnut

or mahogany of scarcely deeper shade than that of dorsal plates. Antennae chestnut, usually paler at the very tips only. Prosternum chestnut, the prehensors more rufous. Venter fulvous to brown, the caudal plates always darker and either reddish or very deep brown. Legs colored like corresponding plates of venter, the caudal pairs being thus always darker.

Body appearing to vary considerably in relative width, the length being mostly as much as eight times longer than width of tenth plate, but in some falling a little below this (7.75) and in others as much as 8.4 times longer. Moderately attenuated cephalad from eighth plate, with the first plate a very little wider than the third and usually a little narrower than the head, occasionally as wide as latter; the average ratio of widths of head, first and tenth plates is 30 : 29 : 35. In one male the widths of head and first, third, eighth, tenth, and twelfth dorsal plates stand to each other as 72 : 72 : 70 : 78 : 78 : 72.

Head slightly wider than long (36 : 35). Caudal margin straight or nearly so; posterior corners conspicuously and widely rounded, the sides immediately in front of them but little excurved, diverging forward to the lateral interruptions which are distinct. The short curved transverse submarginal sulcus opposite interruption of each side evident. The usual semicircular impression on caudal portion clearly marked. There is also present a transverse sulcus immediately caudal of and subparallel with frontal suture, the sulcus being most distinct at the sides. Surface sparsely punctate and moderately uneven.

Eyes composed of from twenty-eight to forty-two, but mostly from thirty to thirty-six, ocelli which are arranged in from five to eight series; *e.g.*, 1 + 3, 4, 6, 6, 6, 5; 1 + 3, 4, 6, 6, 6, 6, 3; 1 + 6, 5, 6, 5, 4, 4, 4; 1 + 6, 5, 6, 5, 5. Single ocellus moderately large, oval. All seriate ocelli deeply pigmented excepting those of first row which are commonly paler as in related species. Of seriate ocelli the caudal ones of first row are clearly the largest

Antennae reaching the beginning of the eighth segment; attenuated, very slender distally. Composed of mostly from thirty-two to thirty-five articles which, distad of the first few, are rather short, considerably shorter ones occurring at intervals among longer ones as in related species.

Prosternum about 1.7 times wider than long. Distance between chitinous spots 1.8 times the width at level of bottom of mesal incision, and 2.5 to 2.7 times as great as length of dental line, the variation depending on number of teeth. Teeth 5 + 5 or 6 + 6, or occasionally 5 + 6; distally narrowly rounded. The prosternal spine situated

immediately ectad of outer tooth as usual, slender and bristle-like, and curved as in *voracior.*

Posterior dorsal plates conspicuously roughened; the anterior ones less strongly so and the first uneven only in about same degree as head. The short transverse sulci most distinctly impressed on the more caudal plates, mostly weak on the anterior ones. Caudal plates with short hairs more numerous than on the anterior. Posterior angles of the seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced; processes of ninth, eleventh, and thirteenth long and acute, those of the seventh obtusely rounded, the inner or mesal edges being convex and long with its ectal or distal portion nearly transverse.

The three longitudinal sulci of ventral plates distinct, being on most broadly and deeply impressed to a little in front of caudal margin. Last plate more densely clothed with short hairs. Sternite of genital segment also densely clothed with hairs especially in the male.

Anal segment in the male densely clothed above with rather long hairs, most of which are curved or uncinate at tips, this being a very characteristic feature of the species. In the female the dorsal hairs of this segment are sparse and straight.

In larger specimens the coxal pores are very large and strongly transverse, while in the smaller adults the form may approach that of the *pseudomaturus* stage, being transversely elliptic and with those at ends of rows often subcircular. In number and arrangement from 6, 6, 6, 5 to 8, 8, 8, 7, other arrangements noted being 6, 7, 7, 6 to 7, 7, 7, 5, and 7, 8, 8, 6.

The single article composing the gonopod of male well exposed, directed caudoectad; sides nearly parallel; distally subtruncate; bearing mostly about four bristles.

In the gonopods of the female the claw is comparatively short; strongly bent; tripartite, the three lobes distinct, the median being considerably larger much as in *vorax* but not so greatly exceeding the lateral as in *mordax*, etc. Basal spines stout and moderately long; mostly uniformly attenuated from base to apex. Mesal side of first article straight, diverging cephalad from mesal side of fellow but little.

The anal legs in the male are short. Fourth article considerably thickened, more so than in *voracior;* dorsal or dorsomesal surface conspicuously bowed ventrad or depressed over middle and posterior portion, or the depression often almost strictly mesal, longitudinally furrowed along depressed surface; also longitudinally furrowed along dorsal surface toward ectal edge of latter. Third and fourth articles rather deeply sulcate longitudinally on ventral surface. Tibia longi-

tudinally furrowed dorsally. Tarsal joints not clearly sulcate mesally. Penult legs very similar to anal but the fourth article but slightly enlarged and not at all excavated mesodorsally or caudodorsally, though the dorsal longitudinal furrow is conspicuous

Length from 18 to 26 mm. A male 25 mm. long has antennae about 12.5 mm. long, anal legs 8.5–9 mm. long and the tenth dorsal plate 2.9 mm. wide.

Last three pairs of coxae laterally armed. Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the second, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$, or $\frac{0, 0, 3, 2, 2}{0, 0, 3, 2, 2}$; of the fourth and fifth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$, or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the sixth to the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$, the thirteenth being the same; of the penult, $\frac{1, 0, 3, 1, 1(0)}{0, 1, 3, 3, 2}$, or $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 2}$, the anterior or ectal dorsal spine of the fourth joint in the latter case being mostly very small, claws two or three, in latter case the anterior accessory being very small; of anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$, the claw single.

Pseudomaturus.— Testaceous with the first plate and the last few darker or not; major plates showing three longitudinal light lines of which the median is more obscure. Head light chestnut-brown. Antennae brown or light chestnut proximally, light brown to yellowish elsewhere. Prosternum dilute chestnut, the prehensors paler. Venter brown to pale brown, posterior plates darker, light chestnut to deep brown, not reddish. Legs fulvous, the posterior pairs usually not darker than the others.

Antennae as in *maturus;* articles thirty-two or thirty-three short and very short ones intermingled.

Ocelli twenty to twenty-eight in five to seven series.

Prosternal teeth, in all specimens examined, 5 + 5.

Coxal pores in most 5, 5, 5, 4 but also 6, 6, 6, 5; small, circular or in part somewhat elliptic.

Gonopods of male small; bristles one or two

Claw of female gonopods smaller than in *maturus* with divisions more slender and acute. Spines as in *maturus.*

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 1, 1}$, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 2}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the second, $\frac{0, 0, 2(3), 2, 1}{0, 0, 2, 2, 1}$ to $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the third to fifth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the sixth to eighth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$ or ventral spines 0, 0, 2, 3, 2 or even 0, 0, 2, 2, 2; of the remaining pairs uniformly as in the *maturus.*

Length 14–18 mm. A female 15 mm. long has antennae 8.5 mm. long; and anal legs 6 mm. long. Widths of head and of first, third, eighth, tenth and twelfth plates to each other as 53 : 48 : 47.5 : 57 : 57 : 52.

Immaturus (early).— General color pale yellowish white, the head

scarcely darker than rest of dorsum and venter also nearly same as dorsum. Legs light, uniform. Antennae slightly darker than the legs, palest distally.

Head wider than long, in ratio 32 : 30.

Articles of antennae thirty-one; short and very short, the shortest ones often occurring in pairs among the somewhat longer ones in distal portion.

Ocelli pale; 1 + 2, 5, 4, 2; 1 + 2, 5, 3, 1.

Prosternal teeth 4 + 4, uniform in size and spacing. (In a measured specimen 1.66 times wider than long. Distance between chitinous spots 1.9 times width at sinus and 2.77 + times the dental line).

Coxal pores small, circular; 3, 3, 3, 2.

Gonopods of female as yet consisting of but two articles but of these the distal one shows slight indications of subdivision and at its apex the claw appears as a pale, acute point. A single basal spine on each side, this being very small and appearing as a mere acute point. First article bearing one or two bristles, the distal one glabrous.

Spines of first legs, $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the third and fourth, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the fifth, $\frac{0,0,2,2,2}{0,0,1,1,1}$, the posterior dorsal spine of the tibia being very small; of the sixth the same or with ventral spines 0, 0, 1, 2, 2; of the seventh and eighth, $\frac{0,0,3,2,2}{0,0,1,2,1}$; of the ninth to eleventh, $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$, as in adult; and of the anal, $\frac{1,0,3,1,0}{0,1,3,3,1}$. Last pair of coxae laterally armed.

Length of specimen described 9.5 mm.; length of anal legs 4.25 mm.; of antennae 5.5 mm. (Widths of head and of first, eighth, tenth, and twelfth plates to each other as 32 : 29 : 33 : 33 : 29).

Locality.— Alabama: Jackson!

This species is very close to *voracior*. Usually both sexes of fully grown specimens of these species are to be distinguished quite readily by the form of the coxal pores, these in *voracior* being circular or broadly elliptic whereas in *devorans* they are larger and mostly strongly transverse. In some cases, however, it is difficult to separate the females; but the males are always distinguishable.

Neolithobius voracior (Chamberlin).

Lithobius voracior Chamberlin, Ann. Ent. soc. am., 1912, **5**, p. 150.

Description.— Dorsum brown, the first plate and the several most caudal ones commonly darker and more reddish or chestnut; plates often showing three longitudinal pale lines. Head conspicu-

ously darker than the dorsum, cherry-red or chestnut, or in others often very dark, nearly mahogany. Antennae chestnut, much lighter distad. Prosternum dark brown or dilute brownish chestnut, with the prehensors paler. Venter yellowish brown, the posterior plates much darker, burnt brown. Legs yellowish brown, the posterior pairs darker, being often somewhat chestnut with distal articles a little paler.

Body more robust than in *devorans*, the length being mostly less than seven times as great as width of tenth dorsal plate (6.8). Considerably attenuated cephalad from eighth plate, with the third plate narrower than the first and the latter clearly narrower than the head. Average ratio between widths of head and first and tenth dorsal plates 68 : 65 : 74.3. Widths of head and of first, third, eighth, tenth, and twelfth plates in a ♂ to each other as 68 : 65 : 63 : 75 : 75 : 68.

Head wider than long. Widest immediately back of eyes. Sides rather strongly convex and converging caudad of the well-marked marginal breaks to the rounded posterior corners. Caudal margin nearly straight or but slightly incurved mesally. The usual subcircular impression on caudal portion. Surface subsparsely punctate, the puncta varying in size but mostly fine; obscurely uneven.

Eyes composed mostly of from thirty to thirty-five ocelli, rarely as few as twenty-three, arranged in from five to seven longitudinal series; *e.g.*, 1 + 3, 5, 5, 5, 4; 1 + 3, 4, 5, 6, 5, 4, 2; 1 + 5, 5, 6, 6, 4, 3; 1 + 3, 5, 6, 6, 6, 4, 3; 1 + 4, 6, 7, 6, 5, 4, 1. Single ocellus large subvertically oval. Ocelli of most dorsal row larger and paler as in related species.

Antennae of moderate length, reaching mostly to the end of the seventh or beginning of eighth segment. Attenuated considerably but the distal portion not very fine. Articles beyond the first several rather short. Hairs moderately long. Articles thirty-two to thirty-six in number.

Prosternum 1.6 times wider than long. Distance between chitinous spots 1.9 times wider than long of prosternum at level of bottom of mesal incision; 2.3 or 2.4 times as great as length of dental line usually, this varying with number of teeth present Prosternal teeth 6 + 6 to 8 + 8, other numbers noted being 6 + 7, 7 + 7, and 7 + 8; either uniform or varying irregularly in size; subacute, being but narrowly rounded at tips. Spine proximally clearly stouter than the hairs, but distally bristle-like, curved; situated immediately ectad of outer tooth.

First dorsal plate with surface similar to that of head. All finely

punctate. Plates roughened, more especially the caudal ones as usual, the elevations or irregular tubercles small. Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced, processes of the seventh much as in *devorans*.

Ventral plates densely punctate and with numerous fine impressed lines which mostly run out from the puncta. The usual longitudinal furrows clearly developed. Hairs of posterior plates more numerous and longer.

Anal segment in male dorsally densely clothed with rather long and strictly straight hairs, these not being at all distally curved or uncinate. In the female the dorsal hairs of this segment are but sparse.

Coxal pores transversely elliptic or in part subcircular; of medium size; in largest specimens more strongly transverse as in the preceding species. In number from 6, 6, 6, 4 to 8, 8, 8, 6, other arrangements frequently noted being 6, 7, 7, 5; 6, 7, 6, 5; 6, 6, 6, 5; 7, 7, 7, 6, and 7, 8, 8, 7.

Gonopods of male rather small; distally strongly rounded or broadly subconic; bearing six or seven long bristles.

Gonopods of female with claw long and rather strongly bent or curved near middle; tripartite, the median division long and acute, the lateral small and also usually acute, the inner or more dorsal one considerably more distal in position than the outer one which is near the middle of length of claw. Basal spines long and stout, subequal, attenuated uniformly from base distad. Basal article with inner side nearly straight.

Anal legs in female short and rather slender; the third, fourth, and fifth articles longitudinally sulcate dorsally, the fourth being most deeply so; the third and fourth articles sulcate ventrally. Penult legs similarly but less strongly sulcate. In the male the penult legs are as in the female; but the anal legs are more strongly modified. Fourth article with dorsal surface depressed or bowed ventrad over middle and proximal portion; relatively thicker than in female; articles longitudinally sulcate along mesal surface, especially so in the more distal ones.

Last three pairs of coxae laterally armed. Spines of first legs, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,2}$; of second, $\frac{0,\,0,\,3,\,2,\,1}{0,\,0,\,2,\,3,\,2}$; of third, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$; of fourth to eighth, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,2,\,3,\,2}$ or $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of ninth to eleventh, $\frac{0,\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$; of twelfth, $\frac{1(0),\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$ or $\frac{1(0),\,0,\,3,\,2,\,2}{0,\,0,\,3,\,3,\,2}$, a spine sometimes borne by trochanter of one leg while absent from the other; of thirteenth, $\frac{1,\,0,\,3,\,2,\,2}{0,\,1,\,3,\,3,\,2}$; of penult, $\frac{1,\,0,\,3,\,1,\,1}{0,\,1,\,3,\,3,\,2}$ or $\frac{1,\,0,\,3,\,2,\,1}{0,\,1,\,3,\,3,\,2}$, the anterior spines of fourth joint in latter case being mostly very small, tarsi ending in three claws but the anterior accessory one

mostly minute as in related species; of anal $\frac{1,0,3,1,0}{0,1,3,3,1}$, or, less often, ventral spines 0, 1, 3, 3, 2, the claw single.

Length from 17 to 24 mm. A ♀ 19 mm. long has antennae 10.5–11 mm. long; anal legs 8.5 mm. long; and tenth tergite 2.8 mm. long. Males have similar relative proportions.

Immaturus (very late).— Dorsum yellow to brown with the caudal plates, and mostly also the first one, darker and in the darker specimens more or less reddish; major plates in most specimens showing the usual paler lines. Head brown to dull chestnut, the frontal region a little paler. Antennae brown, yellowish or sometimes rufous distad. Prosternum testaceous to dark brown, the prehensors paler ectally. Venter yellow to light brown, the caudal plates darker, brown to dull chestnut. Legs in general like venter; the posterior pairs yellowish or dilute orange, or, in darker specimens, dark brown proximally with the tarsi and tibiae, in part, remaining light.

Articles of antennae thirty-one; a tendency for two shorter articles to alternate with single longer ones in distal portion.

Ocelli, *e.g.*, 1 + 5, 5, 4, 3. Single ocellus paler and much larger than the others. Seriate ocelli decreasing in size cephalad as usual; the most caudal one of second series largest but much smaller than single ocellus.

Prosternal teeth 4 + 4 or less often 5 + 5.

Coxal pores small, circular, pale edged: 3, 4, 4, 3; 4, 4, 4, 3; 4, 4, 4, 4.

Gonopods of male distinct, pale, glabrous.

Claw of female gonopods small, narrow and acute with one or both lateral teeth indicated as small acute points at base. Basal spines 1 + 1, slender and acute Hairs of articles few.

Spines of first legs, $\frac{0,0,2,1,1}{0,0,2,3,2}$; of the second, $\frac{0,0,2,2,1}{0,0,2,3,2}$; of the third to ninth, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the tenth and eleventh as in adult; of the twelfth, $\frac{1,0,3,2,2}{0,0,3,3,2}$; of the other pairs as in adult, but those of anal being, $\frac{1,0,3,1,0}{0,1,3,3,2}$; last three pairs of coxae laterally armed.

Length 10.5–13 mm. A ♂ 12.5 mm. long has antennae 6 mm. long and anal legs 5 mm. long.

Agenitalis II.— Yellowish brown; the head a little darker, palest over the frontal region. Antennae pale brown, lighter distally. Venter yellowish, with the legs similar. Prosternum and prehensors a little darker than venter. Body in life suffused with violaceous.

Head slightly longer than wide (51 : 50).

Articles of antennae twenty-six; in distal portion the shortest articles often occur in twos at intervals among the others. Hairs long, subdense.

Ocelli in three series: 1 + 4, 3, 1; 1 + 4, 4, 2. Single ocellus large, vertically elliptic.

Prosternal teeth 4 + 4, the innermost on each side smallest, the other three subequal, subacute. (Width of prosternum 1.6 times wider than long. Distance between chitinous spots two times width at sinus and 3.2 times the dental line).

Angulation of dorsal plates as in *maturus* but processes of seventh not conspicuous.

Coxal pores very small, the most proximal one minute, circular: 2, 2, 2, 2.

Spines of first legs, $\frac{0, 0, 0, 0(1), 1}{0, 0, 1, 1, 1}$; of the second, $\frac{0, 0, 0, 2, 1}{0, 0, 1, 1, 1}$; of the third, $\frac{0, 0, 1, 2, 1}{0, 0, 1, 1, 1}$; of the fourth and fifth, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 1, 1}$ or dorsal spines of fourth 0, 0, 1, 2, 1, posterior dorsal spines of fourth and fifth articles very small; of sixth to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$, the anterior dorsal spines of fourth and fifth joints of the eleventh pair being very small; of the twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 1, 1, 1}$; of the thirteenth, $\frac{0, 0, 3, 1, 1}{0, 1, 1, 1, 1}$; of the penult, $\frac{0, 0, 2, 1, 0(1)}{0, 1, 2, 2, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$. No lateral spines detected on any coxae.

Length 6.5 mm. Widths of head and of first, eighth, tenth, and twelfth dorsal plates to each other as 50 : 44 : 44 : 51 : 49 : 43, the proportions being thus considerably different from those of *maturus*.

Pullus IV (Larva IV).— Light yellow or somewhat yellowish white throughout, but the head a little darker than the dorsum.

Head slightly wider than long.

Articles of antennae twenty-one, the ultimate long, the other short and very short, moniliform.

Ocelli in two series: 1 + 3, 1; 1 + 3, 2. Ocelli well separated, all pale. Single ocellus largest, vertically elliptic, but the caudal ocellus of upper row not much smaller.

Prosternal teeth 4 + 4, small. Ectal spine bristle-like and curved as in older stages. (Prosternum 1.6 times wider than long. Distance between chitinous spots 1.9+ times greater than width at sinus; only 2.46 times the dental line).

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates weakly extended, obtuse.

One small pore on each twelfth coxa.

Last three pairs of legs appearing as closely oppressed cylindric buds in which segmentation is beginning to be indicated.

Spines of first legs, $\frac{0, 0, 0, 0, 0}{0, 0, 0, 1, 1}$; of the second to fourth, $\frac{0, 0, 0, 0, 0}{0, 0, 1(0), 1, 1}$; of the fifth to twelfth, $\frac{0, 0, 0, 0, 0}{0, 0, 1, 1, 1}$. The ventral spine of third article very small or minute.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 42 : 32 : 32 : 33 : 24.

TYPE LOCALITY.— Mississippi: Fernwood!

KNOWN LOCALITIES.— Mississippi: Fernwood! Canton! Byram!

Very easily distinguished by the character of the hair clothing the anal segment dorsally, the hairs in *devorans* being long and dense with nearly all hairs uncinate distally whereas in *voracior* they are all straight. *Neolithobius devorans* averages larger. It is also relatively more slender and the width of the head as compared with that of the tenth dorsal plate is as 68 : 70 whereas the corresponding average ratio in *voracior* is 60 : 65.5. The ventral spines of anal legs in *devorans* seem to be constantly 0, 1, 3, 3, 2 whereas normally in *voracior* they seem to be 0, 1, 3, 3, 1, though variations to 0, 1, 3, 3, 2 occur.

NEOLITHOBIUS XENOPUS (Bollman).

Plate **3**, fig. 5.

Lithobius xenopus Bollman, Proc. U. S. N. M., 1888, **11**, p. 349. Bull. 46, U. S. N. M., 1893, p. 101.

DESCRIPTION.— Dorsum dusky brown, a median longitudinal light line and less distinct lateral ones evident on some of the plates. Head similar but more reddish. Antennae proximally like head, paler distad. Venter brown, the posterior ones darker and more dusky. Legs fulvous, the posterior pairs darker.

Body of type (♂) about 7.75 times longer than the width of the tenth plate. Widths of head and of the first, third, eighth, tenth, and twelfth plates to each other as 49 : 47 : 48 : 55+ : 56 : 52, the first plate thus being narrower than the head and than the third plate.

Head a little wider than long (49 : 47) Of the form usual in related species. Caudal margin widely though but slightly incurved. Sides converging caudad from lateral breaks. The usual semicircular impression on caudal portion and the median impression in front of sulcus. Finely punctate.

Ocelli about twenty-five in five longitudinal series: 1 + 6, 4, 5, 5, 3 and 1 + 5, 4, 6, 6, 3. Single ocellus large, obliquely elliptic.

Antennae short; articles thirty, short, decreasing distad.

Prosternum 1.5+ times wider than long. Distance between chitinous spots 1.9 times width at level of bottom of median sinus; 2.66+ times the dental line. Teeth subacute, 5 + 7. Tubercle of spine moderately large, situated ectad of outermost tooth; spine less bristle-like than usual, moderately stout proximally (on one side stouter than on the other and evidently counted by Bollman as a tooth since he gives the formula as 6 + 7 instead of 5 + 7).

Dorsal plates shining; under lens showing a fine roughening or tuberculation which is more pronounced caudad as usual.

Coxal pores small, circular: 6, 6(7), 6, 4.

Gonopods of male of moderate size, distally strongly convex; bearing five bristles.

Anal legs of male short; the third article crassate, especially distally above and on mesal side, the median dorsal spine at distal end large, distally serrate; fourth article short and stout, dorsomesal surface strongly concavely excavated or rather joint as a whole convexly bowed ventrad, dorsally a rounded thickening contiguous with third joint and at distal end a conspicuous, twisted and in part plate-like process which extends dorsomesad, the article dorsally characteristically furrowed (Plate 3, fig. 5); a spine at tip of process extending caudad, short, distally rounded and characteristically serrate. Tibial and tarsal joints longitudinally sulcate on mesal side and less strongly so on the ectal. Penult legs also with the distal articles longitudinally sulcate on the mesal side; third, fourth, and fifth articles conspicuously longitudinally sulcate along dorsal surface; none of articles enlarged or lobate.

Spines of first legs, $\frac{0,0,3,2,1}{0,0,2,3,2}$; of the second, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the third to eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; of the twelfth and thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,3,2}$; of the anal, $\frac{1,0,3,1,0}{0,1,3,3,2}$. Last three pairs of coxae laterally armed.

Length of ♂ (type) 15.5 mm.; width of tenth plate 2 mm.; length of antennae 6.5 mm.; length of anal legs 6 mm.

Locality.— Georgia: Macon!

The type, a male, is the only specimen of this interesting species at present known. The anal legs are more strongly modified than are those of any other species of the genus.

Neolithobius helius Chamberlin.

Ann. Ent. soc. Amer., 1918, **11**, p. 379.

Description. —General color of dorsum brown, the head chestnut. Antennae chestnut, paler, yellowish, distally. Legs yellowish, the posterior pairs darker, brown to chestnut, but with the distal joints bright orange or yellowish.

Head subcordate, but anteriorly truncate between the antennae and the caudal margin excepting at ends straight or nearly so. Wider than long in the ratio 7.5 : 6.

Ocelli forming a compact oblong area. Ocelli arranged mostly in four to six longitudinal series with the single ocellus much larger, pale: *e.g.*, one 6, 5, 5, 4, and one 6, 7, 6, 5, 3.

Antennae moderately long, reaching to the seventh pediferous segment. Articles typically from thirty to thirty-three in number, short and very short, the ultimate variable in proportionate length, sometimes equalling the two preceding ones and sometimes much shorter. Subdensely setose distally, more sparsely setose proximally.

Prosternum with distance between chitinous spots three times the length of the dental line Lateral sloping margins conspicuously incurved. Prosternal teeth mostly rather small, mostly 5 + 5, but also 5 + 6, 6 + 6, 6 + 7, and 7 + 7, the most mesal teeth on each side often much reduced and lower in position. Mesal incision very narrow.

First dorsal plate across its anterior end only a little narrower than the head and equal in width to the third plate.

Coxal pores very small, circular. Examples of arrangement and number: 4, 5, 5, 4; 5, 6, 6, 4.

Claw of female gonopods rather small, tripartite, the lobes acute, the median obviously longer and stouter than the others. Basal spines 2 + 2; moderately slender, in ventral view with sides parallel to acute distal portion.

In the male the anal legs have the third article strongly clavately enlarged distad of the base, the thickening chiefly represented by a high ridge situated dorsomesally and bearing distally a stout spine bifid serrate at the apex somewhat as in *xenopus*, and a patch of long bristles. This rounded, ridge-like lobe extends mesad well beyond inner side of the succeeding or fourth article. Fourth article conspicuously excavated and longitudinally furrowed along the dorsomesal surface as usual, but the joint as a whole not bowed; at ends and along sides of furrow are long setæ.

Spines of the anal legs, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$, claw single; penult, $\frac{1, 0, 3, 3, 1}{0, 1, 3, 3, 2}$, claw single; thirteenth, $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 2}$ — $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; twelfth, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; second to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; first, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 1}$. Last three pairs of coxae laterally armed.

Length 14 to 18 mm.

Type Locality.— Georgia.

Known Localities.—Georgia: Okefinokee Swamp: Billy's Island, June; Honey Island, May 31 and June 1, 1912.

Neolithobius suprenans, sp. nov.

Description.— Dorsum dark brown to nearly black. Head clearer brown, in some of chestnut tinge. Antennae brown, paler distad. Legs light brown.

Body in the female moderately narrowing cephalad from the tenth plate, in the male more strongly so.

Head wider than long in ratio 55 : 52; suborbicular. Caudal margin nearly straight, curving forwards at ends. Marginal breaks distinct. Head widest in front of breaks.

Ocelli numerous, small and regular, arranged much as in *transmarinus* but averaging fewer. Single ocellus much the largest.

Antennae moderately long. Articles in type thirty-one; moderate, proportions nearly uniform. Ultimate article about equalling the two preceding ones together.

Prosternal teeth uniform, the outermost ones on each side a little more widely separated from each other than the more mesal ones: 5 + 6; 6 + 6; 6 + 7; 7 + 7.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced.

Coxal pores from circular to transverse; porigerous area on each coxa considerably depressed.

Claw of female gonopods tripartite but the lateral lobes much smaller and appearing as small teeth near middle of length; the large median lobe subacute.

Anal legs of the male with the fourth article a little enlarged; its dorsal surface bowed ventrad and longitudinally furrowed, the other articles slender. Anal and penult legs with ventral spines 0, 1, 3, 3, 2. Dorsal spines of penult legs 1, 0, 3, 1, 1. Tibiae of all legs with but two ventral spines.

Basal spines long and slender, acutely conically acuminate from base or from a little above it.

Length 17–19 mm.

Type Locality.— New Mexico: Las Vegas Hot Springs!

Known Localities.— New Mexico: Las Vegas Hot Springs! San Geronimo! (T. D. A. Cockerell.) Colorado: Hayden's Exped., Camp 1! (May 23, 1873) Boulder Co.! (T. D. A. Cockerell). Texas: Brownsville!

Neolithobius underwoodi (Bollman).

Plate 3, fig. 6.

Lithobius underwoodi Bollman, Proc. U. S. N. M., 1888, **11**, p. 350. Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 46.

Description.— Dorsum fulvous to deep brown; usually most of the plates with a median longitudinal pale line and a more diffuse one on each side diverging from it caudad; first plate prevailingly darker than the others and approaching the head in color, the most caudal plates also commonly darker and sometimes reddish or chestnut. Head pale ferruginous to chestnut and dark cherry-red, often dusky over its middle portion. Antennae proximally concolorous with head, distally becoming slightly paler or more rufous, the ultimate article sometimes abruptly much lighter. Prosternum testaceous to deep brown and chestnut, the anterior border and the prehensors usually paler. Venter yellow to testaceous and brown; the caudal plates darker, deep brown to dark reddish brown, in all with a paler median area. Legs of nearly same color as corresponding plates of venter, the posterior pairs being thus darker, dark brown to chestnut, the tarsus mostly paler.

Body robust, averaging in ♂♂ 7.1 and in ♀♀ 7.2 times longer than width of tenth plate, the variation in proportion being but slight. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other on average in males as 67 : 66.8 : 70.6 : 79 : 80 : 74; in females as 64 : 61.6 : 64.6 : 73 : 73.3 : 67. Thus in males the first dorsal plate is seen to be wider relatively to the head than in females, or rather it is really the head that is narrower.

Head wider than long in ratio 33 : 32. Caudal margin straight or slightly excurved. Marginal breaks distinct. The semicircular furrow toward caudal border distinct. The usual longitudinal median impression in front of the suture. Surface not at all roughened, smooth and shining. Sparsely clothed with hairs of about same length as those upon the antennae.

Ocelli mostly from twenty-six to thirty-six in number; usually in six series, less often in seven: *e.g.*, 1 + 5, 6, 6, 7, 5, 5; 1 + 7, 7, 5, 5, 6, 4; 1 + 6, 6, 5, 5, 6, 4; 1 + 4, 5, 6, 6, 5, 5, 1; 1 + 5, 5, 4, 4, 5, 3; 1 + 5, 5, 7, 6, 6, 3. Single ocellus moderately large, oval. Of seriate ocelli those of top row are considerably larger than the others. Series somewhat arched dorsad. Organ of Tömösvary pale, distinct; immediately in front of most ventral row of ocelli; in outline larger than the adjacent ocelli.

Antennae from moderate to long, mostly reaching the eighth and sometimes the ninth body segment, but also in some only attaining the seventh. Articles from thirty-two to forty in number, thirty-six being apparently the number most frequent. Articles all rather short; in the distal portion longer and shorter articles may be intermingled.

Prosternum from 1.75 to 1.85 times wider than long, averaging the same in both sexes Distance between chitinous spots 1.9–2 times width at level of bottom of median sinus; 2.16–2.43 times the dental line. Prosternal teeth 5 + 5 to 8 + 8, most frequently 6 + 6; often differing on the two sides, as 5 + 6, 6 + 7 or 8 + 7. Teeth uniform, moderately large, narrowly rounded distally. Spine slender distally bristle-like and somewhat curved, inserted ectad and a little caudad of most ectal tooth.

Dorsal plates shining, nearly smooth, but the most caudal ones becoming rather obscurely finely tuberculate and bearing more numerous short hairs. Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced, the processes becoming more elongate and acute from the seventh to the thirteenth.

Ventral plates shining; subdensely punctate with fine puncta. The lateral longitudinal sulci distinct, the caudal oblique portion being especially sharply impressed. Median furrow obscure or absent on anterior plates but often showing on the caudal ones.

Coxal pores of moderate size, transversely elliptic, those at ends of rows often circular: *e.g.*, 6, 6, 6, 4; 6, 6, 6, 5; 6, 7, 7, 5; 7, 7, 7, 6; 7, 8, 8, 6; 7, 8, 7, 6.

Oblique distal face of male gonopods bearing mostly five or six moderately long hairs.

Claw of female gonopods moderately long and stout, well excavated mesally; tripartite but the lateral teeth very small and commonly indistinct, the inner one near distal end of claw and small and obtuse, the outer one more proximal in position and more acute. Basal spines rather large; inner and outer subequal or the inner slightly shorter; of nearly uniform width from base to beginning of about distal third of length, then abruptly converging to an acute point.

Anal legs short. In the female, slender throughout; the third and fourth articles ventrally longitudinally sulcate. In the male the legs are also slender excepting the fourth article which is moderately thickened; the fourth article also has the dorsal surface concavely depressed or bowed ventrad, in the way usual in other species of Neolithobius, longitudinally sulcate or sulcus obscure, the anterior end of article above more densely pilose; third and fourth articles

ventrally sulcate as in the female. Penult legs of male somewhat thicker proximally than those of female, the fourth article moderately complanate above and with a weak longitudinal furrow.

Spines of first legs, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the second and third, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the fourth to the eighth the same or $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$ (often having the first formula for left leg, the second for the right, or *vice versa*, of a given pair); of the ninth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the tenth the same, or with spines on one side, at least, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$; of the eleventh, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 3}$ or with the ventral spines on one side 0, 0, 3, 3, 2; of the twelfth and thirteenth, $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 3}$; of the penult, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$, claws two or three, a minute anterior accessory sometimes being detectable; of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 2}$, claws two. Last three pairs of coxae laterally armed.

Length 17–24 mm.; mostly from 19 to 21 mm. Average length of measured males 20.6 mm.; width of eighth plate 2.9 mm.; length of antennae 12.16 mm.; length of anal legs 8.5 mm. Average length of measured females 19.33 mm.; width of eighth plate 2.68 mm.; length of antennae 10.63 mm.; length of anal legs 8 mm.

Pseudomaturus.— Yellow to brown, the first plate darker, but paler than head as in adult. Head chestnut. Antennae light chestnut. Venter yellow to brown, with caudal plates darker. Legs like venter, the caudal pairs usually correspondingly darker.

Antennae as in *maturus*.

Ocelli: *e.g.*, 1 + 3, 4, 5, 5, 3; 1 + 5, 5, 5, 4, 3; 1 + 5, 5, 5, 4, 4; 1 + 5, 5, 5, 5, 4, 2; 1 + 6, 6, 5, 5, 3, 1(0); 1 + 6, 4. 5, 5, 3. Single ocellus broadly subtriangular with apex ventrad and upper side convex.

Prosternal teeth 5 + 5, to 7 + 7, as in adult or with mesal teeth a little more frequently reduced.

Coxal pores circular to slightly elliptic: 5, 5, 5, 3; 5, 5. 5, 4; 5, 6, 6, 5; 6, 7, 7, 5; 6, 7, 7, 6.

Gonopods of male somewhat smaller and paler than in adults with bristles not usually exceeding four.

Claw of female gonopods somewhat smaller and thinner than in adults and the lateral teeth more distinct and more acute. Basal spines as in *maturus* or nearly so.

Anal legs of male modified as in *maturus* but with the dorsal depression of the fourth joint commonly less marked.

Spines of second and third legs, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$ or as in *maturus*. Spines of other legs as in *maturus*.

Length 15–17 mm.

Immaturus.— Dilute yellow to light brown, the most caudal plates a little darker in most specimens but not so the first one. Head from

an orange-brown to dilute chestnut. Venter yellow, the most caudal plates more brownish to somewhat orange. Legs from nearly white to yellowish, the caudal pairs usually darker with the distal joints light.

Articles of antennae twenty-nine to thirty-one, most frequently the second number; all short, very short ones often occurring in pairs, these representing recently subdivided single ones.

Ocelli eleven to eighteen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 4, 4, 2; 1 + 3, 4, 5, 2; 1 + 5, 5, 4, 3. Single ocellus in shape as in older stages; usually pale. Ocelli of top row commonly pale.

Prosternal teeth 4 + 4 to 5 + 5 but mostly either 4 + 5 or 5 + 5; moderate, uniform or with most mesal one when teeth on a side number five reduced. Distance between chitinous spots 2.75 times dental line.

Angulation of the dorsal plates already as in the adult.

Coxal pores small, circular, pale edged; mostly 3, 3, 3, 3.

Gonopods of female bi- or triarticulate, pale. The two distal articles, where three are present, are glabrous while the proximal one bears one or two hairs in addition to the single spine which may be minute. Claw appearing as a small, pale, acute point without indications of the lateral teeth or quite absent when only two articles are present in the gonopod.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 1, 1, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 1, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fourth and fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the sixth and seventh, $\frac{0, 0, 3, 2, 2}{0, 0, 1, 2, 2}$ to $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the eighth and ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$ or with ventral spines 0, 0, 1, 2, 2; of the tenth and eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$; of the twelfth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the remaining ones as in the *maturus*.

Length 9.5–12.5 mm. A ♀ 10 mm. long has anal leg 5 mm. long; antennae 6 mm. long; and tenth plate 1.4 mm. wide. The widths of head and of the first, third, eighth, tenth and twelfth plates to each other as 35 : 32 : 35 : 39 : 39 : 34.

Type Locality.— Georgia: Macon.

Known Localities.— Alabama: Selma! Morgan! Mapleville! Thomasville! Jackson! Anniston! Georgia: Macon (L. M. Underwood); Atlanta! Tallulah Falls! South Carolina: Landrum! Seneca!

EXPLANATION OF PLATES.

PLATE 1.

PLATE 1.

Zinapolys zipius Chamberlin. (Kootenai Co., Idaho. Type).

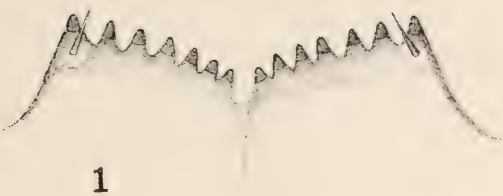
Fig. 1. Anterior portion of prosternum showing teeth and spines.
Fig. 2. Claw of ♀ gonopods, subventral view.
Fig. 3. Basal spines of right gonopod of ♀, ventral view.

Gonibius rex (Bollman). (Tallulah Falls, Ga. Type).

Fig. 4. Claw of left ♀ gonopod, ventral view.
Fig. 5. Basal spines of right ♀ gonopod.

Lithobius atkinsoni Bollman. (Taylors, S. C.).

Fig. 6. Basal spines of left ♀ gonopod.



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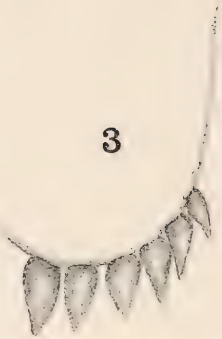

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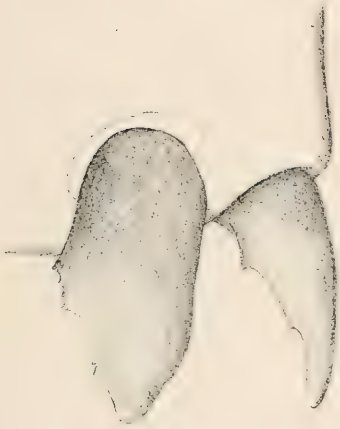

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PLATE 2.

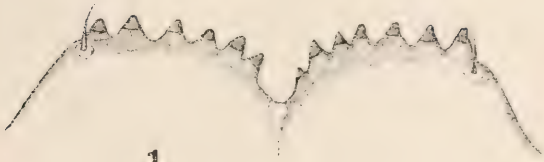
PLATE 2.

Lithobius forficatus (Linné). (Philadelphia, Pa.).

Fig. 1. Anterior border of prosternum.
Fig. 2. Claw of ♀ gonopod, submesal view.
Fig. 3. Basal spines of left gonopod of ♀, ventral view.

Neolithobius vorax (Meinert).

Fig. 4. Left anal leg of ♂, mesal view. (Jackson, Miss.).
Fig. 5. Claw of right gonopod of ♀, ventral view. (Ocean Springs, Miss.).
Fig. 6. Basal spines of left gonopod of ♀. (Ocean Springs, Miss.).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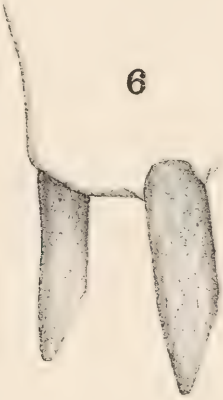
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PLATE 3.

PLATE 3.

Neolithobius mordax (L. Koch). (Jackson, Ala.).

Fig. 1. Claw of right gonopod of ♀.
Fig. 2. Basal spines of left gonopod of ♀.

Neolithobius transmarinus (L. Koch).

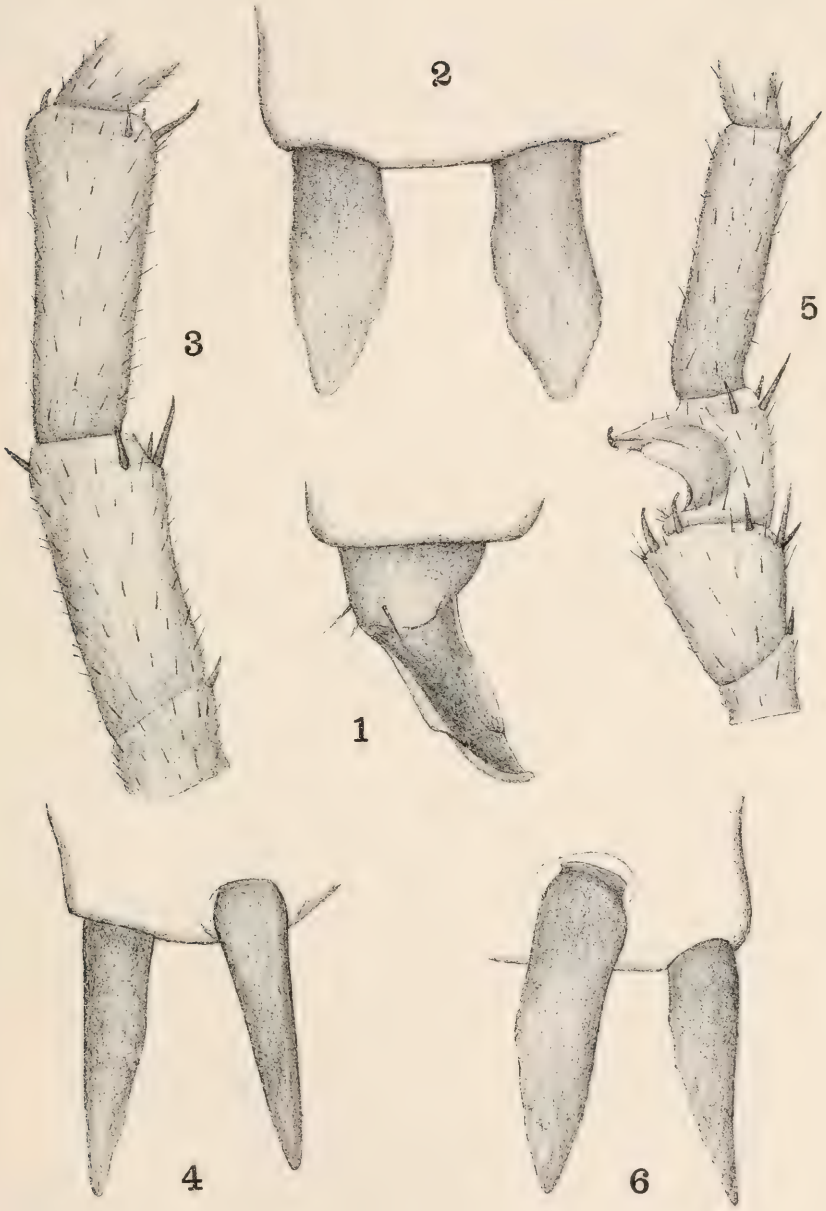
Fig. 3. Anal leg of ♂, mesal view. (Canton, Miss.).
Fig. 4. Basal spines of left gonopod of ♀. (Brookhaven, Miss.).

Neolithobius xenopus (Bollman). (Macon, Ga. Type).

Fig. 5. Anal leg of ♂, lateral view.

Neolithobius underwoodi (Bollman). (Selma, Ala.).

Fig. 6. Basal spines of right gonopod of ♀.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